IMPLEMENTATION OF GRAPHIC ORGANIZERS AND INTERACTIVE WAY, «TRIAL» IN THE TEACHING PROCESS

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Anatatsiya: The article presents the importance of modern educational technologies in the educational process to develop creative and analytical thinking of students, as well as to secure the threads passed to laboratory and practical training. The article deals with the implementation of graphic organizers, such as Venn diagrams, and interactive way «TRIAL» in the learning process.

Keywords: education technology, systems thinking, creative thinking, analytical information, a graphic organizer.

"Science is one of the key components of the national model for personnel training, serving as both a producer and user of highly qualified specialists, as well as a developer of advanced pedagogical and information technologies."

Education is a managed process, and its outcome largely depends on the prepared didactic design. Didactic design, in turn, is the product of educational technology. Managing students' cognitive activity according to a didactic design is considered the pedagogical foundation of educational technology.

In lesson planning based on pedagogical technology, the primary requirement is to build knowledge upon students' life experiences, previously acquired knowledge, and interests. Even when students have insufficient prior knowledge of the subject, pedagogical

technology ensures that they do not develop negative experiences. Such an educational process increases the engagement of all students.

The success of the educational process depends not only on its structure but also on the effectiveness of the applied methods. Teaching methods hold a central place in educational theory. The organization and implementation of cognitive activity involve knowledge transmission, reception, comprehension, retention of learning materials, and the practical application of acquired knowledge and skills.

The educational process should be conducted with students' interests in mind, fostering their curiosity about the subject, problem-solving abilities, future professional competence, and other intellectual and personal qualities. Today, pedagogical researchers frequently use modern pedagogical concepts such as "innovation," "pedagogical technology," and "teaching technology" in their studies.

The concept of technology is used not only in production but also in various fields of activity, including pedagogy. Researchers such as A.E. Denisova, A.V. Bespalko, B. Farberman, N. Saidakhmedov, A. Ochilov, and others have extensively explored the concept of pedagogical technology, each providing a unique definition in their studies.

B.L. Farberman defines pedagogical technology as a unique, innovative approach to teaching. He considers it an expression of socio-engineering thinking in pedagogy, a technocratic scientific mindset applied to education, and a certain standardization of the learning process.

R. Ishmukhamedov, A. Abduqodirov, and A. Pardaev, in their research, discuss teaching technology and its main components. Teaching technology consists of four key elements: teaching format, equipment, diagnostics, and teaching methods and techniques.

There are both traditional and non-traditional teaching methods and techniques, which can be categorized as active and passive based on their nature. Each method has its own history and development mechanism, with many having been successfully tested over the

years and proven to be highly effective. Today, several advanced pedagogical technologies are gaining popularity.

The distinctive feature of the new relationships being formed is that, unlike traditional education, they do not restrict students' independence or learning activities but instead guide them towards a set goal. Rather than having activities carried out through orders, the pedagogical process is effectively organized to increase students' interest in studying the fundamentals of a subject, without limiting their personal needs, desires, inclinations, or potential. This approach directs the acquisition of knowledge and skills through democratic means. In organizing the pedagogical process effectively, interactive methods play a crucial role.

Interactive teaching methods are primarily based on working in small groups (or pairs). When organizing groups, it is important to consider both the number of students and the nature of the students participating in the lesson. Students can be categorized into four types based on their nature (capabilities):

1. Activists (active)

2. Thinkers

3. Theoreticians

4. Pragmatists

Each small group should have one representative from each of the mentioned categories to ensure the group's full functioning. At the discretion of the professor or teacher, equal-sized teams can also be created using various methods.

The use of modern educational technologies also places certain demands on teachers, including:

1. Leadership

2. Experience

3. Attractiveness

4. Innovation

5. Respect and deserving of respect.

Thus, the teacher must ensure that students are allowed to express their opinions freely and be superior in experience and innovation. The teacher plays a crucial role in organizing the lesson by assigning tasks, distributing them, managing time, overseeing the process, and summarizing the results. Therefore, a teacher must possess leadership, experience, and other essential qualities. It is known that mastering subjects is carried out through lectures and practical lessons. Practical lessons enhance the future professional's skills. Based on this, various methods can be used to improve the level of understanding of each lesson topic.

Interactive methods applied in lessons serve different purposes. Through these methods, students engage in activities such as finding solutions to problems, identifying possible solutions, selecting the most suitable one, reviewing previous topics, or organizing and systematizing knowledge. For example, "graphic organizers" activate students' thinking, teach them to connect lesson topics, and engage them in independent observations on similarities and differences. Modern graphic organizers like the "Fishbone Diagram," "Lotus Flower," "How?," "Why?," and the "Venn Diagram" are widely used in teaching.

In fields like medicine, interdisciplinary and intersubject relationships are also present. To consolidate knowledge through these connections, many graphic organizers, including the "Venn Diagram," are widely used. The "Venn Diagram" was introduced by John Venn in his 1881 book "Symbolic Logic" published in London. The diagram, known as the Euler-Venn diagram, helps compare concepts, ideas, or phenomena.

Venn Diagram Construction Rules:

The Venn diagram is used for comparing two or three objects, concepts, or phenomena. The construction process consists of three stages:

1. Stage 1: Students are introduced to the rules for constructing the diagram.

2. Stage 2: Activities for comparison are conducted in pairs, small groups, or individually, using the diagram.

3. Stage 3: The results of the activities are analyzed and evaluated.

To construct a Venn Diagram, two intersecting circles are drawn (if comparing two parts of a topic, two circles are drawn; if comparing three parts, three intersecting circles are drawn). Each circle contains key information about one part of the topic. Where the circles intersect, the topics are compared, and common information is listed.

In the case of medical chemistry, the topics of Endogenous Complex Compounds and Exogenous Complex Compounds are related and complement each other. These topics provide general information about complex compounds and also offer specific details about both exogenous and endogenous complex compounds.

Students are tasked with comparing the two classes of complex compounds using the Venn Diagram and identifying the similarities between them. The task can also be framed as finding the differences between the two types of complex compounds, which would encourage deeper analysis and a clearer understanding of each concept.

This method allows students to visually organize the similarities and differences between complex compounds, helping them understand the concepts more thoroughly.

The diagram in the first illustration shows the structure of a Venn diagram with two intersecting circles. In the first circle, six characteristics specific to Exogenous Complex Compounds are listed, while in the second circle, six characteristics of Endogenous Complex Compounds are provided.

The similarities between Exogenous and Endogenous Complex Compounds are highlighted in the diagram, such as the fact that both types include first-order complexes formed through the interaction of complex substances. As a result, the 1st characteristic in both circles is shared, and it is placed in the intersecting area of the diagram (represented as 1x1). Similarly, other characteristics like the presence of a metallic central atom are also common. For example, in Exogenous Complex Compounds, the central atom is typically iron (as in red blood cells), while in Endogenous Complex Compounds, it could be copper (as in the enzyme carbonic anhydrase).

After the small groups create their own diagrams, they come together to compare and consolidate their findings. This exchange of information allows students to enhance their understanding and fill in the diagram with additional data. By discussing and reflecting on the information, students are able to reinforce their understanding of the topic.

The advantages of Venn diagrams include:

- Systematic thinking: Students develop skills in comparison, contrast, and analysis.

- Memory retention: The diagram helps reinforce the information learned, making it easier for students to recall key concepts.

- Time efficiency: It helps present complex information in a concise manner, requiring less time to process and analyze compared to traditional methods.

By using Venn diagrams, students can better organize their thoughts and solidify their understanding of complex topics.

The drawback of a Venn diagram is that it becomes difficult to fit large amounts of information inside the designated circles. If the order of the presented information is not marked, it is necessary to fully write the similarities in the intersecting areas of the circles. The designated area (formed by the intersection of the circles) often doesn't allow for all information to be contained. Therefore, it is recommended to conditionally display the

information using numbers (1x1). Nowadays, Venn diagrams are used in many graphic organizers in higher education institutions.

In the teaching of medical chemistry, Venn diagrams are used to reinforce certain topics. These topics can include titrimetric analysis methods, carbohydrates, aldehydes and ketones, soap-forming and non-soap-forming lipids, and other related issues. The interactive methods used in teaching can be categorized into those used in lectures and those used in practical sessions, although some methods can be applied in any lesson type. Some topics require specific methods to be applied based on their nature.

In medical chemistry, the topic of "Inorganic Elements" introduces students to the effects of chemical elements on the body. There are many chemical elements, and each can have different effects on the human body depending on its concentration. These elements are classified as biotic (beneficial) or toxic (harmful), as excessive biotic elements can cause harmful effects beyond a certain threshold.

For example, calcium is found in the blood and bones. Its deficiency in children causes rickets, which leads to bone deformities. However, an excess of calcium can also cause bones to become brittle. Toxic elements, such as mercury, perform beneficial functions in small amounts, such as increasing blood circulation and improving heart function.

Both biogenic and inorganic elements play important roles in pharmaceutical preparations and have positive effects in various pathological conditions. To help students fully retain this information, an interactive method called "Court Trial" is applied to teach the topic of inorganic elements.

In this method, students are divided into two groups: Group 1 - "Prosecutors" and Group 2 - "Defenders".

The teacher introduces the students to the rules of the lesson. Group 1, the "Prosecutors", and Group 2, the "Defenders", perform the court trial on the elements. When

the teacher announces the name of an element, the "Prosecutors" group lists its biotic effects, and the "Defenders" group lists its toxic effects, alternately.

Each member of the small groups strives to fully perform the task assigned to them (defending or accusing the element) and listens carefully to the opinions of their peers, gaining new information. Small group members have the right to supplement the opinions of other students in their group as team members. The opposing group members can express their objections to the facts presented and demand justifications, so the students will only present well-founded facts.

The professors or teachers have significant responsibilities during the lesson. They must manage the court trial effectively, knowing when to indicate norms for each case and allocate time properly. The court trial interactive method mainly covers the section of the lesson where the students clarify their knowledge.

After the court trial for one element is concluded, the teacher summarizes, moves on to the next element, and assigns new roles for the "Prosecutors" and "Defenders" groups. The topic of inorganic elements mainly focuses on the toxic effects of elements, and there is more information for the Defenders, while the Prosecutors have less information. For the first element, Group 1 serves as the "Prosecutors", and Group 2 serves as the "Defenders", but for the second element, the roles are reversed.

Students gather information from additional resources and the internet and use this information when defending or accusing the elements.

The amount of information on the topic is vast, and because there are many similarities between them, it would have been difficult for students to grasp the material. However, after the "Court Trial" interactive method was developed by the staff of our department, the level of understanding improved, and the topic became more interesting, meaningful, and memorable for the students. Below, we will examine the interactive

method using some examples of elements with toxic effects. The teacher will assign the tasks.

Advantages of the "Court Trial" Interactive Method:

- This method helps to fully direct students' thinking towards the topic, encouraging comparison, free expression of ideas, and the ability to defend their opinions.

- It ensures that the impact of the process stays with the students even after the lesson ends.

Disadvantages of the "Court Trial" Interactive Method:

- One of the drawbacks is the amount of time it requires.

- This method may not be applicable for every lesson.

Conclusion:

In conclusion, pedagogical technology processes consist of chains of actions, movements, and connections that must fully align with the set goals and the expected outcomes. To connect two aspects of a covered topic or to link a new topic at the end of a lesson, using the "Venn" diagram can lead to good results. This allows students to connect and compare their ideas (information, knowledge), which contributes to the long-term retention of the material.

The use of the "Court Trial" interactive method results in positive outcomes for mastering topics that require a large volume of information. It encourages the teacher's responsibility to manage time effectively, ensuring that the lesson makes the most of the allocated time.

Utilizing modern teaching technologies develops the skills necessary for future professionals to independently solve problems. Students are motivated to solve open problems without a "ready-made recipe," thus fostering cooperation and collaborative work

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