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THE EFFECTIVENESS OF INNOVATIVE PEDAGOGICAL TECHNOLOGIES IN TEACHING THE PHYSIOLOGY AND HYGIENE OF THE DIGESTIVE SYSTEM

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Abstract

This scientific article analyzes the theoretical and methodological foundations of using innovative pedagogical and information technologies in teaching the physiology and hygiene of the digestive system in general secondary and specialized secondary educational institutions. The effectiveness of lessons organized on the basis of modern digital tools, interactive methods, problem-based learning, project-based approaches, and STEAM integration is revealed. The role of innovative approaches in developing students' healthy lifestyle competencies is also substantiated.

Keywords

digestive system, physiology, hygiene, innovative education, interactive methods, virtual laboratory, healthy nutrition, pedagogical technology.

Introduction. Modernization of the educational process is one of the priority directions of contemporary pedagogy. In particular, there is an increasing need to apply modern pedagogical technologies in teaching biology topics directly related to human health. The topic of the physiology and hygiene of the digestive system not only explains vital processes occurring in the human body but also contributes to the formation of a healthy lifestyle among students. Traditional teaching methods mainly rely on lectures and reproductive approaches. However, in order to deeply understand complex physiological processes, connect them with everyday life, and develop hygienic skills, interactive and innovative approaches are required.

Main Part. 1. Scientific and Methodological Foundations of Teaching the Physiology of the Digestive System. The digestive system is a complex biological mechanism that provides the body with energy and plastic substances. Mechanical breakdown, enzymatic digestion, absorption, and metabolic processes occur sequentially within this system. Explaining the essence of these processes requires not only theoretical information but also visual modeling.

When teaching physiological processes, it is advisable to follow these methodological principles:

systematic and consistent presentation;
visualization;
interdisciplinary integration;
connection with practice.

For example, explaining the breakdown of proteins, fats, and carbohydrates through integration with chemistry strengthens students' understanding.

2. Innovative Pedagogical Technologies and Their Types

2.1. Multimedia and Animated Modeling

Digital presentations, 3D animations, and interactive diagrams allow step-by-step demonstration of digestive processes, making complex mechanisms easier to understand. In particular, demonstrating the composition of gastric juice, enzyme activity, and absorption processes in the intestines through animation ensures high effectiveness.

2.2. Virtual Laboratories and Simulations

Virtual laboratories create opportunities for students to conduct experiments in a safe and convenient environment. For example, modeling enzyme activity under different conditions

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(acidic or alkaline environments) helps explain biological regularities. This approach is especially relevant for educational institutions with limited material and technical resources.

2.3. Problem-Based Learning Technology

Lessons organized around problem-based questions develop students' analytical thinking. For example:

Why does improper nutrition lead to gastrointestinal diseases?

What is the impact of fast food products on the human body?

Such questions foster scientific inquiry and independent conclusion-making skills among students.

2.4. Interactive Methods

Methods such as "Brainstorming," "INSERT," "Cluster," "Fishbone," and "Role-playing" actively engage students in the learning process. For instance, organizing group discussions on "Healthy and Unhealthy Nutrition" enhances critical thinking skills.

2.5. Project-Based Learning and STEAM Approach

Project-based learning helps students deeply master hygiene-related topics. For example, developing a "One-Week Healthy Nutrition Plan" fosters responsibility and independent analytical skills. Through the STEAM approach, integration of biology, chemistry, and information technology is ensured.

3. Innovative Approaches in Teaching Digestive System Hygiene

The formation of hygienic knowledge should not be limited to theoretical explanation. Teaching based on practical activities and real-life situations is more effective.

The following methods can be applied:

- Practical assignments on developing a healthy diet;
- Calculating the energy value of food products;
- Identifying mistakes through video analysis;
- Reinforcing knowledge through online tests and quizzes.

Such approaches strengthen healthy lifestyle skills and encourage students to make conscious nutritional choices.

4. Pedagogical Effectiveness of Innovative Technologies

The application of modern technologies leads to the following outcomes:

1. Increased level of knowledge acquisition;
2. Development of independent thinking;
3. Strengthening of interdisciplinary connections;
4. Increased learning motivation;
5. Formation of a healthy lifestyle culture.

Moreover, opportunities for differentiated instruction expand, taking into account students' individual abilities. Digital tools provide rapid assessment and effective feedback.

Conclusion. The use of innovative pedagogical technologies in teaching the physiology and hygiene of the digestive system is an integral part of modern education. Multimedia tools, virtual laboratories, interactive methods, and project-based learning approaches deepen theoretical knowledge and develop practical skills among students.

This approach contributes not only to effective mastery of academic content but also to the formation of a healthy lifestyle. Therefore, educators should systematically integrate innovative technologies into the educational process.

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