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**THE IMPORTANCE OF TEACHING PHYSIOLOGY BASED ON MODERN
PEDAGOGICAL TECHNOLOGIES IN MEDICAL UNIVERSITIES**

Umrqulova Sojida Husanovna

Tashkent State Medical University, PhD, associate professor

<https://orcid.org/0009-0000-5361-5779>

Abstract

This article discusses the relevance of teaching medical programs using medical and pedagogical technologies, particularly through the use of "Biopac Student Lab" equipment in the instruction of "Normal Physiology."

Keywords

Medicine, pedagogical technologies, physiology, scientific research methods, masticography, mastication, "Biopac Student Lab"

**ВАЖНОСТЬ ПРЕПОДАВАНИЯ ФИЗИОЛОГИИ С ИСПОЛЬЗОВАНИЕМ
СОВРЕМЕННЫХ ПЕДАГОГИЧЕСКИХ ТЕХНОЛОГИЙ В МЕДИЦИНСКИХ
УНИВЕРСИТЕТАХ**

Аннотация

В статье рассматривается актуальность преподавания медицинских дисциплин с использованием медицинских и педагогических технологий, в частности с применением оборудования «Biopac Student Lab» при обучении дисциплине «Нормальная физиология».

Ключевые слова

медицина, педагогические технологии, физиология, методы научных исследований, мастикография, жевание, «Biopac Student Lab»

The development and modernization of contemporary medicine impose new requirements on every healthcare professional. Our President has placed significant emphasis on the construction of higher education institutions, their reconstruction, and the creation of conditions for students to acquire knowledge effectively. Educational institutions are consistently being equipped with new tools, devices, improved curricula, modernized and tested standards, and the latest editions of textbooks (often leased), while the computerization process is being implemented in accordance with state programs.

As in all educational processes, the ongoing transformations in our country's education system correspond to global goals aimed at integrating individuals into society. In particular, competence-based approaches in documents on educational system improvement are being recognized as a crucial conceptual framework for updating the educational content.

During the reform of the continuous education system in our country—i.e., reorganizing teaching and learning processes based on educational standards—special attention is being paid to the teacher's activity and pedagogical skills, as it is the teacher who shapes well-rounded the future generations. One principle highlighted in the Law "On Education" and the National Program for Personnel Training is the identification of talented and gifted youth and ensuring their comprehensive development. At all stages of the education system, fostering the creative abilities of young people is essential. One of the primary responsibilities of teachers is to recognize students' initiatives, innovative ideas, and talents in a timely manner, and assist in their realization. Through the development of organizational skills and other abilities among



students, it is necessary to cultivate highly moral and competent young leaders who can contribute to the development and future of our country.

A pressing issue in recent years is the application of innovative technologies in higher education institutions and their challenges and prospects. The efforts of our esteemed President, M. Sh. Mirziyoyev, to equip all educational processes with the latest modern devices and electronic boards illustrate the support provided to teachers in delivering quality education. Consequently, educators must possess professional knowledge specific to their activities, be capable of independent pedagogical practice, and communicate acquired knowledge effectively to students. The use of innovative technologies in teaching, their creation, and management directly address current priorities in education and upbringing.

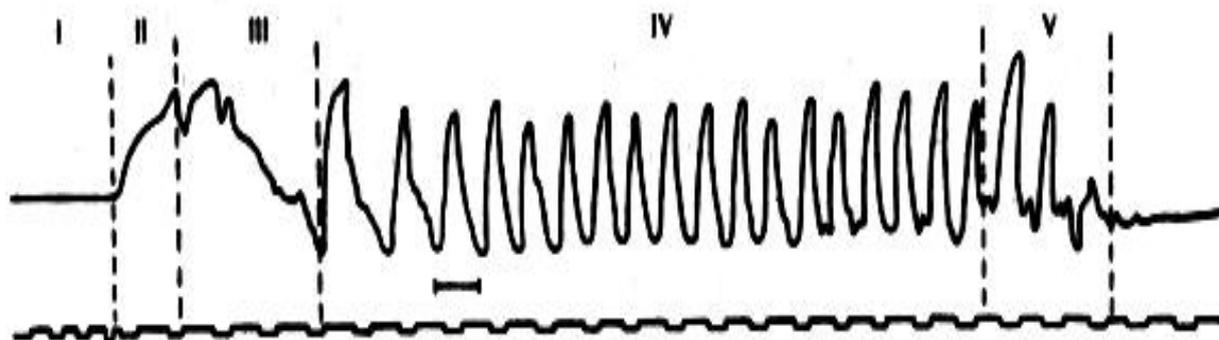
The application of educational technologies in the classroom enhances students' intellectual potential and strengthens their theoretical knowledge. Furthermore, integrating information and communication technologies with modern pedagogical methods enriches and improves the quality of education.

Currently, many countries have accumulated extensive experience in using interactive methods that increase students' academic and creative activity while ensuring the efficiency of the teaching and learning process. One such example can be observed at the Department of Physiology and Pathology of Tashkent State Medical University. For instance, during the topic of food digestion, experiments on examining the facial and jaw muscles and observing the process of mastication in the oral cavity are conducted using interactive methods with the "Biopac Student Lab" program. These experiments have been shown to generate significant interest among students.

Masticograph

is a graphical method for recording lower jaw reflex movements. In masticography, a student is fitted with a special tape on the face and jaw, which is connected to a computer linked to the Biopac apparatus. When a command is given, the student continues chewing food, and the chewing process is displayed as a curve on the screen. Mastication involves mechanical breakdown of food before swallowing. The upper and lower teeth assist in mechanical processing, while the muscles of the jaw, lips, and tongue contract to perform the chewing. Signals from receptors in the oral cavity are transmitted via the trigeminal nerve to the medulla oblongata, and then to the cerebellum and cerebral cortex. Neurons involved in mastication form the chewing center.

The chewing process can be divided into the following phases: the resting phase, the phase of introducing food into the oral cavity, kneading, the main chewing phase, and preparation for swallowing.



Phase 1 – Resting: The jaw is inactive, and small jaw muscles relax before food enters the mouth. This phase appears as a baseline on the masticogram.



Phase 2 – Food introduction: The mouth opens, and food is placed in the oral cavity. The first rise of the curve represents jaw opening and food intake.

Phase 3 – Kneading: The food begins to adjust to initial softening, reflected as a peak on the curve. The plateau indicates that chewing muscles have overcome food resistance without breaking it.

Phase 4 – Main chewing: The periodic rise and fall of the curve represent jaw movements during mastication. The upper part of the wave indicates the maximum lowering of the lower jaw, and the slope shows the speed of elevation.

Phase 5 – Preparation for swallowing: The formed food bolus is ready for swallowing, seen as a decreasing wave on the graph.

Masticography is widely used in dentistry to study the biomechanics of mastication and related pathologies.

Certainly. Below is the information on masticography presented in formal scientific English, suitable for medical or dental studies.

Masticography is a functional diagnostic method used to record and analyze the movements of the mandible during the process of mastication. The method provides a graphical representation of chewing activity and is widely used to assess the functional state of the masticatory system.

Object of Study

Masticography evaluates the coordinated function of:

- the masticatory muscles,
- the temporomandibular joint (TMJ),
- dental arches and occlusal relationships,
- central and peripheral nervous system regulation.

During mastication, the mandible follows a specific movement trajectory. These movements are recorded using a special device called a masticograph, which traces mandibular motion onto paper or a digital medium. The resulting graphical record is known as a masticogram. Masticography is a valuable functional diagnostic technique that allows objective evaluation of the masticatory system. It plays an important role in prosthodontics, orthodontics, and gnathology by facilitating accurate diagnosis and effective treatment planning.

If you would like, I can also provide:

- a short exam-oriented summary,
- comparison with electromyography (EMG),
- or illustrated explanations for better understanding.

Just let me know. In conclusion, the use of modern informational and pedagogical technologies in medical universities provides great opportunities to integrate the educational process and visualize physiological characteristics, thereby improving the quality of medical education.

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