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"Methods for the Study of Digestion in the Oral Cavity" The use of Multimedia Technologies in the Study of the Topic

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ABSTRACT

The use of alternative methods in the study of the physiology of the digestive system in the modern education system, information and pedagogical teaching technologies plays a rather large role. Increasingly, multimedia technologies are being used in training, which enrich the learning process and make it more effective by involving most of the sensory components of the student in the process of perceiving educational information. Multimedia technologies make it possible to programmatically combine text, graphic, and animated slides with the simulation results of the processes under study.

KEYWORDS: *multimedia technologies, mastikaciography, Biopac, amylolytic activity, salivary amylase*

INTRODUCTION

Currently, one of the promising areas for improving the educational process is the use of multimedia (MM) technologies. The use of MM technologies opens up new opportunities in organizing the educational process, as well as in developing the creative abilities of students [1,4]. The advantage of using multimedia technologies is the operational use of information, the combination of audio and visual material, animations, etc. This makes it possible to implement the classical principle of didactics - the principle of clarity - at a new, qualitatively higher level. Multimedia technologies enrich the learning process, make learning more effective, involving most of the student's sensory components in the process of perceiving educational information. Thanks to multimedia technologies, oral speech has changed from static to dynamic, that is, it became possible to track the studied processes over time. Multimedia technologies can be used both for individual distance learning with interactive properties of control of acquired knowledge, and for group. They activate educational information, make it more visual for perception and easier to assimilate.

Methods

A multifunctional complex for electrophysiological studies Biopac Student Lab is used to record a mastikaciogram. The complete set of the equipment allows to conduct demonstration practical classes on all topics of human physiology presented in the curriculum. This complex contains a whole range of classical and modern clinical methods for studying the functional state of the human body. Among which there are 9 basic and 11 additional methods. Mastikaciography (face electromyography) refers to additional methods.

Results

As an example, we give one lesson on the topic "Methods for the study of digestion in the oral cavity." In this lesson, the following work is performed:

1. Mastikaciography. MM program "Biopac student lab".
2. Observation of the amylolytic activity of saliva. MM program "Practical Physiology".

Mastikaciographyis a method of studying the chewing movements of the lower jaw. The graphic study of the chewing movements of the lower jaw makes it possible to establish the sequence of cycles of the chewing process, the ratio of the duration of the individual phases of the chewing period and the nature of the chewing movements, which differ in individual characteristics. With the help of mastikaciography, it is possible to determine the time of the chewing cycle before swallowing and the duration of its individual phases, the number of chewing movements, the magnitude of the amplitude of mouth opening. The quality of the chewing process affects the digestion and absorption of food, stimulates the reflex activity of all parts of the digestive tract and is of great importance for the study of digestion in the oral cavity in health and disease [1].

In order to optimize the experiment, a modern Biopac apparatus with a multimedia program "Biopac student lab" is used to study the functional characteristics of the chewing process.

Calibration:

1. The subject should sit in a relaxed state, breathing normally with his mouth closed.
2. An imitation of one cycle of chewing movement is made (2 sec.).
3. One oscillating movement of the curve is noted on the monitor.
4. The whole process of calibration during registration takes 8 seconds.

Check in:

1. Turn on to Record - record.
2. Introduce food into the mouth and begin the chewing recording process.
3. Chewing is registered on the monitor with a time stamp on the lower scale and a mark of the amplitude of jaw movement on a vertical scale.
4. At the end of the recording, the Done mode is entered.
5. The sensor is removed from the patient.
6. The description of the steps of data analysis is made.

On the curve of the mastikaciogram, the chewing phases are sequentially recorded (within 18 seconds):

1. rest phase
2. The phase of introducing food into the oral cavity
3. Trial chewing
4. Main phase of chewing
5. Formation of the food lump

The proposed method allows you to make a high-quality record of the chewing process with step-by-step registration, carrying out the necessary stages of analysis and obtaining a printout of the graphic results of the experiment.

To determine the amylolytic activity of saliva, the multimedia program "Practical Physiology" is used. The program "Practical Physiology" contains materials for 8 sections: heart, nervous, muscular, respiratory, endocrine, digestive systems, excretion, central nervous system. Each section includes from 4 to 6 experiments with descriptions of the theory, technology for conducting experiments using a virtual 3-dimensional image. This program allows a great depth of experience, the student can work in an individual time mode, repeat parts of the exercises, use theoretical material, learn technologies for conducting experiments, bringing the experience to confidence in the correct results [1].

Each lesson has theoretical material on the topic with graphics, animation, explanations, the possibility of individual manipulation and a practical part describing the implementation. This program is used as a teaching system for the entire physiology course.

In the experiment, the substrate specificity of salivary amylase is determined. Principle of action:

Saliva amylase is mixed alternately with three carbohydrates (starch, sucrose, cellulose), which have a different structure. Add 10% NaOH and CuSO4 solution

To identify monosaccharides, the Trommer reaction is used, and the red color that appears at the end of the reaction proves that only starch is broken down by this enzyme. Salivary amylase is a glycolytic enzyme, the main substrates of which are starch and glycogen [2]. The activity of this enzyme is enhanced by Cl^- ions. The most effective amylase is at a temperature of 37-38 ° C and in a slightly alkaline medium (pH = 7.5-8.0). Enzymes, being biologically active catalysts, have the so-called substrate specificity, which means the ability of an enzyme to identify a certain substrate and interact only with it (absolute substrate specificity) or to identify 2-3 substrates and interact only with them (relative substrate specificity) [3]. After the theoretical part of the topic, a technology is provided for step-by-step work:

1. Add starch and saliva amylase to the test tube;
2. Press the "Start" button on the thermostat;
3. After the incubation period has elapsed, add a few drops of NaOH to the test tube;
4. Add a 10% CuSO4 solution to the test tube;
5. Press the "HEAT SAMPLE" button. The contents of the test tube boil;
6. Determine the color obtained as a result of the experiment;
7. We repeat this experiment with sucrose and cellulose.

In a test tube with starch, at the end of the reaction, a red color appears, therefore, in the oral cavity, of the proposed carbohydrates, only starch is broken down.

Conclusion

The use of such technologies significantly activates educational information, makes it more visual for perception and easier to learn, improves the quality of teaching the subject, and reduces financial costs for animals.Multimedia computer technologies give the teacher the opportunity to quickly combine various means that contribute to a deeper and more conscious assimilation of the studied material, save lesson time, and saturate it with information.

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