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CONSİDERATİON OF PHYSİOLOGİCAL AND ANATOMİCAL FEATURES OF ADOLESCENTS İN TEACHİNG BİOLOGY

Abstract. After the independence of Azerbaijan, the measures taken in the direction of the democratization of our society opened wide opportunities for the emergence of modern ideas in the field of education, the study of international experience, and the renewal of education in terms of form and content. Education is a sacred area for our people, so education should always be at the forefront of our state. This is confirmed by the historical period in which we live. One of the main tasks today is to seriously engage in the training and education of teenagers. From this point of view, every teacher should deeply master the regularities of growth and development processes, which reflect the main direction of children's and teenagers' life activities, and establish appropriate teacher-student relationships, thus, only educators who know the anatomy and physiology of the child's body at the appropriate level can improve the efficiency of training in addition to developing their mental abilities. In various learning situations, the teacher must be able to choose the appropriate tool to achieve success. Taking into account the features characteristic of each age period of students in the training process, if training strategies are used correctly in teaching the subject, it is possible to eliminate the states of mental fatigue in students, develop their thinking and research skills, and increase interest in education. Such an approach to education develops students' thinking abilities and the ability to independently acquire knowledge. Important tasks are set before educational institutions in this direction. It is known that the volume and content of the material given in the training process is massive, that is, the students' abilities are not taken into account. Recently, modern training technologies are applied without conducting physiological studies. Taking into account the essence of the changes occurring in the body of students, emotionality, frenzy, impatience typical of adolescence, some teachers'

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failure to take into account the individual character of the brain's analysis-synthesis ability and integrative activity lead to tension both in the learning process and in the teacher-student relationship.

Keywords: physiology; anatomy; training; education; process; activity; student; teacher; adolescence; organism; features.

INTRODUCTION / ВСТУП

Formulation of the problem. After gaining independence, the Republic of Azerbaijan carried out fundamental reforms in the field of national statehood and socio-economic and cultural development. As in all areas, the education system is undergoing a process of development. Globalization and modernization taking place in social and political life also put forward the improvement of the education system as an important task. One of the leading factors here is the implementation of fundamental reforms in the field of domestic education in accordance with world standards, the formation of our education on the basis of national and universal values, democratic and secular principles, in accordance with the history, culture, national traditions of our people.

The building of a secular state in Azerbaijan, the correct formation of a sense of national pride largely depend on how we build our education today, how effectively we use world experience.

At present, society has been tasked with educating young people with high intellectual communication skills, the ability to cooperate, who have mastered universal human values, have a high culture, and are able to express an independent opinion. The first point of the main goal of education in the "Law on Education" is expressed as follows: to educate an independent and creatively thinking citizen and a person who understands his responsibility to the Azerbaijani state, faithful to the national traditions and democratic principles of his people, respecting human rights and freedom, as well as the ideas of patriotism and Azerbaijanis.

The main goal in the system of education of the younger generation, an important strategic line is the maximum development of the natural capabilities of the individual. Taking into account the characteristic features of students for each age period in the educational process, with the correct use of learning strategies in teaching the subject, it is possible to eliminate mental fatigue in students, develop their thinking and research abilities, and increase interest. in education. This approach to learning develops the thinking abilities of students and the ability to independently acquire knowledge.

In this direction, important tasks are set for educational institutions. It is

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known that the volume and content of the material presented in the learning process are massive, that is, the abilities of students are not taken into account. Recently, modern teaching technologies have been used without conducting physiological classes. Taking into account the essence of the changes taking place in the body of students, emotionality, irascibility, impatience, characteristic of adolescence, the individual nature of the analytical-synthesizing ability and integrative activity of the brain in some teachers leads to tension both in the educational process and in teacher-student relationships.

At the same time, according to the document "State Strategy for the Development of Education in the Republic of Azerbaijan", approved by the order of the President of the Republic of Azerbaijan I. Aliyev dated October 24, 2013, our country is the world's leading country in terms of the quality of results and vastness. It is planned to implement measures in five strategic areas to create an educational system with an infrastructure based on advanced technologies, competent teachers and education managers.

It is the second strategic direction, which provides for the modernization of human resources in the field of education. This direction serves to form a competent teacher who applies innovative teaching methods and ensures effective assimilation of the content of education, and includes improving the professionalism of teachers, creating new systems for assessing students' achievements, identifying and developing the talents of students, as well as those who need special care, includes creation of an inclusive teaching methodology.

Thus, on the basis of all this, the pedagogical and methodological literature on the problem was analyzed and a systematic observation was carried out. The emotional attitude to the educational process, activity in the educational process, the degree of fatigue, the ability to understand, memorize, the ability to express an independent opinion, tolerance to the educational load are determined. During the conversation with parents and teachers, the students' attitude to learning was clarified, the level of theoretical knowledge in school experience was determined from the psychological, sociological, didactic and biological points of view.

The study of school experience shows that some biology teachers turn to the possibilities of information technology in order to take into account the peculiarities of the anatomical and physiological development of adolescents. However, observations and surveys show that not all teachers pay enough attention to the possibilities of taking into account the characteristics of the physiological development of adolescents. This is due to several reasons. Some teachers do not have a clear idea of the importance of taking into account the

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characteristics of the physiological development of adolescents, while others consider it unnecessary and useless.

Analysis of major research and publications. The conducted studies showed that A. Agaev [3], F. Orudzhev [9], F. Rustamov [10], M. Abdullaev [1], Zh. Najafov [13], M. Garaev [12] and others studied certain anatomical and physiological features, hygiene and higher nervous activity, age periods, conducted research, published textbooks, manuals and scientific articles. However, although all scientific research is to some extent related to the problem, until today the possibilities of the anatomical and physiological characteristics of students have not become the object of research.

AIM AND TASKS / МЕТА ТА ЗАВДАННЯ

Purpose: The goal of modern anatomy and physiology is the desire not only to describe the facts, but also to generalize them, to find out not only how the body works, but also why it has such a structure. To answer this question, she explores both the internal and external connections of the organism. It is known that everything in nature is interconnected. Also, a living human body is an integral system. Consequently, anatomy studies the organism not as a simple mechanical sum of its constituent parts, independent of its environment, but as a whole, which is in unity with the conditions of existence.

Anatomy studies not only the structure of a modern adult, but also explores how the human body has developed in its historical development. To this end:

- study of the development of the human race in the process of evolution of the animal world – phylogenesis;
- explores the process of formation and development of man in connection with the development of society – anthropogenesis;
- considers the process of individual development of the human body – ontogenesis;
- taking into account individual and gender differences in the shape, structure and position of the body, its constituent organs, as well as their topographic relationships.

The ***tasks*** of modern anatomy are:

1. Description of the structure, shape, position of organs and their relationships, taking into account the age, gender and individual characteristics of the human body.

2. The study of the interdependence of the structure and shape of organs with their functions.

3. Finding out the laws of the constitution of the body as a whole and its

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constituent parts.

The study of anatomy in the education system is determined by the following factors:

- firstly, anatomy, as one of the fundamental morphological sciences, has a general educational, ideological and educational value;
- secondly, anatomy lays the foundation for the study of other biomedical and sports disciplines;
- thirdly, anatomy is of applied importance for students and teachers.

THE THEORETICAL BACKGROUNDS / ТЕОРЕТИЧНІ ОСНОВИ ДОСЛІДЖЕННЯ

As you know, the foundation of human health is laid in childhood. That is why teachers should know human anatomy and physiology, try to properly organize the education of children and adolescents. As with all multicellular organisms, human ontogenesis (individual development) is divided into two stages – the embryonic and postembryonic periods. The embryonic period of development includes the period from fertilization to birth, and the postembryonic period includes the period of individual development of the organism from birth to death. Scientists divide the period of postembryonic development into several stages. This periodization is extremely important. Thus, the attitude of children of different ages to different sports, the training load, the level of endurance are different, as well as their ability to work. For the correct organization of the educational process, it is advisable to divide the development into periods. Since ancient times, many scientists have given a classification of age periods. Some of them recommended that this classification be based on the development of the nervous system, and others on energy processes.

A person goes through different age periods in his development, and each period has a certain impact on the development of personality. Each age period has its own characteristics. Based on these characteristics, the teacher can correctly direct the formation of personality.

Characteristics of preschool children. During this period, a number of anatomical and physiological features are manifested. The child develops physically: in early childhood (1–3 years), his height increases by an average of 4–5 cm, and weight by 1–2 kg per year, and by 5-6 years, growth increases by 5–5 cm. 6 cm and weighing 2–2.5 kg. Although the musculoskeletal system of children at this age is significantly developed, their bones are flexible. Therefore, it is necessary to ensure that the child sits correctly, sleeps, and does not carry weight. At this age, the child's brain mass increases (reaches 1350 g), the regulatory function of the

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cerebral hemispheres is somewhat enhanced. But in children, since the influence of the subcortical region of the brain is great, they have difficulty controlling their feelings. Such children also show certain psychological characteristics: emotions, perception, memory, speech develop. Cognitive activity increases, the child seeks to learn everything, asks adults many questions.

Z. Babaeva writes that when admitting 6-year-old children to school, "it should be taken into account that the body of a growing child is not yet fully mature, its functional features are not fully formed, and the child's ability to work is limited. When improving the programs of education and training in the pedagogical process, it is important to take into account not only the achievements of the child of this age, but also those mental and physical suffering that it will cost him" [4].

The will of a preschool child is weak: he has a highly developed imitation and is easily influenced. A positive example of parents is of great importance to him. Games, sports, work, routine help to strengthen his will and overcome difficulties.

The sensory-emotional world of children aged 3-6 is rich. They like fun games, entertainment, stories and humor. Due to their influence, moral and aesthetic feelings are formed in children.

The main activity in preschool age is the game. When conducting children's games, it is necessary to pay attention to the fact that the game is not only a means of entertainment; Let the child learn life in the game, educate and develop mentally.

"The period of school age is divided into three parts: junior school age (6-10 years old), middle school age (10–15 years old), senior school age (15–17 years old)" [1, p. 89].

The development of children in these age periods goes in three directions: 1) anatomical and physiological development; 2) psychological development; 3) intellectual development.

Junior school age (6–10 years) is a period of physiological changes in all organs and tissues. At this age, the growth of children is 4–5 cm per year. and weight 2–3 kg. increases. There is an increase in muscle strength of the lower and upper limbs. The musculoskeletal system of younger schoolchildren is stronger than that of preschoolers, and cardiovascular activity is stable. Ossification of the skeleton in younger schoolchildren has not yet been completed. Thus, the fact that the spine at this age is still very mobile can in some cases lead to a curvature of the spine, that is, as a result of the wrong choice of the desk or the wrong sitting of the student when writing. This negatively affects the performance and physical development of the student. For this reason, the desk at which the child sits at

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school should serve his normal development. At this age, teachers and parents must constantly monitor what sports students are involved in. The muscles of younger schoolchildren are strengthened, their volume increases, and the overall strength of the muscles increases. At this time, large muscles develop faster than small ones. For this reason, the student has difficulty writing. It is not advisable to give more written assignments to students in grades I–II. Rewriting incorrectly written essays that do not meet the standards of calligraphy tires the student and reduces his desire to write.

In younger students, the muscles of the heart develop intensively. Depending on the diameter of the carotid arteries, the brain is supplied with the necessary amount of blood. Starting from the age of seven, the brain noticeably increases. At this age, students have their own psychological characteristics. Thus, in children at this age, involuntary attention, mechanical memory, and concrete thinking develop. School life requires from the child not only mental stress, but also physical endurance and strength.

The initial stage in the life of a child entering the new conditions of school life is revealed more clearly. Most children are psychologically prepared for this. They come to school with joy, ready for unusual events, different from family and kindergarten life. The internal position of the child is important for two reasons.

Firstly, the child's feeling and expectation of something new in school life helps him accept the teacher's requirements regarding behavior in the classroom, relationships with classmates, and the daily routine. They are perceived by the child as important and inevitable requirements. A professional teacher must clearly explain to the child the rules of conduct in the classroom and at school, at home and in public places from the first day of his arrival at school. Untimely explanation of the rules of behavior at school will lead to the fact that the child will lose interest in school life.

The second internal position is connected with the positive attitude of the child to the study of science. Before entering school, the child has ideas and dreams, albeit vague, about the necessary education that he will receive in the future. The child strives for science and education. For this reason, his interest in the events taking place around him and the desire to know everything increase. This interest makes him strive to study at school.

Thus, the first stage of the child's school life consists in following the teacher's requirements regarding his behavior at school and at home and in forming an interest in the content of the subjects. The passage of this stage by the child at the proper level requires high professionalism from the class teacher. A child who has just come to school suddenly becomes a member of a

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large team. He meets new friends and comrades at school. On the other hand, students differ from each other in their physical and mental development, abilities and interests, character. That is, during this period, each child is a unique microcosm. Without taking into account these different aspects, it is impossible to achieve achievements in the process of teaching subjects. Young children are more impulsive and involuntary – they like to act quickly and without delay. A student of this age cannot persevere to overcome difficulties in order to achieve any goal, and in case of failures, he loses self-confidence.

The conducted studies show that, since the functional maturation of the brain has not yet been completed in younger schoolchildren, their active attention in a lesson averages 20 minutes, and in adolescents it slightly increases to 25–30 minutes. From all this, we can conclude that the teacher, taking into account such characteristics of a teenager, not only applies appropriate pedagogical methods when teaching a new subject, but also when checking students' achievements, preparing assessment tools, etc. Such pedagogical processes should take into account the mental abilities of children.

The science of didactics seeks answers to the following questions: what to teach, how to teach, how much to teach, where to teach and whom to teach? In this educational process, it is important to take into account the psychological aspects of the relationship between the teacher and the student:

- ensuring a calm attitude;
- addressing the child by name;
- avoid stressful situations;
- setting tasks in the lesson according to the principle from simple to complex;
- giving the student time to think about the answer when asking a question;
- praise in front of everyone, blame in private, etc.

In order not to overload children, the teacher must correctly build the learning process. The correct construction of the educational process means planning a lesson in accordance with the goal, setting tasks in advance, predetermining teaching methods, activities of oneself and students, choosing methods that correspond to the learning style of students.

Experts believe that students memorize and apply 95% of what they learn on their own.

Studies show that when a teacher speaks alone during a lesson, the children stop listening to him after 10–12 minutes, it is necessary not to explain new knowledge, but to organize students to master it.

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To relieve fatigue in children, 10 minutes of gymnastics are carried out. Finger gymnastics trains the small muscles of the hand, stimulates speech, and increases efficiency.

Adolescence occupies a special place among the age periods. Biologists call this age period the “transition period” or “puberty”. This period plays an important role in the life of every person. In many cases, how this period ends plays a decisive role in the later life of the individual. The transition period may actually start 1–2 years earlier or later, depending on the environment.

In modern science, adolescence is considered to be 11–15 years old for girls and 12–16 years old for boys. According to some sources, in a number of countries this age period was extended by scientists even up to 25 years.

Adolescence is very different from other age periods. It manifests itself sharply throughout the body. These changes occur both physiologically and psychologically, socially and mentally. These areas of a teenager's development have a direct impact on the events taking place in the classroom, causing the teenager to become more impulsive and sometimes react inappropriately to events. Sometimes the teenager himself suffers greatly from them. He is very sensitive to any attitude of the people around him.

In recent years, there has been an acceleration of puberty in children and adolescents, which is associated with acceleration. Acceleration is more pronounced in adolescence. Before the advent of acceleration, the physical and spiritual development of children and adolescents complemented each other. However, starting from the end of the 70s, physiological development outstripped intellectual and mental development due to acceleration. These cases are especially common in hot regions.

According to some scientists, one of the negative aspects of acceleration is that the infantile teenager is in a very difficult position against the background of his accelerating (rapidly growing children) peers. On this basis, a number of problems arise both for the teenager himself and for his parents.

A teenager is no longer a child, he has a completely different way of thinking and outlook on life. He seeks to acquire certain skills in order to take a certain position in the future. During adolescence, there are rapid changes in the body, relationships, and intellect. At this time, the rate of physiological and biochemical processes in the body increases, assimilation (synthesis) prevails over dissimilation (decay) in cells and tissues, the function of the endocrine glands, the pituitary gland and the thyroid gland increases. It is as a result of strengthening the function of these glands that rapid growth, development in the genital organs, and the appearance of secondary sexual characteristics are observed.

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As a result of the activation of the functions of the pituitary and adrenal glands, the body's ability to adapt to the environment, the reaction to infections and colds, increases. In this age period, many gender differences in the anatomical structure of boys and girls are clearly visible, which is explained by an increase in the amount of hormones in the blood.

So, at this age, the growth of children is growing rapidly. The annual growth in boys is 6–10 cm, and in girls it is 7–9 cm. Since puberty in girls begins earlier than in boys, girls 10–13 years old are taller than boys of their age. But after 15 years, their rapid growth slows down.

Many parts of the nervous system are involved in the humoral regulation of the function of internal organs. The most important of these are the hypothalamus and pituitary gland, which are the main branches of the midbrain. The hypothalamus is an important neurosecretory center that ensures the implementation of hormonal influences on the activity of internal organs, as well as on the activity of the nervous tissue itself, which is the highest autonomic nerve center of the brain. The hypothalamus and pituitary gland interact with each other and form the hypothalamic-pituitary system, the work of which is based on the principle of feedback. Thus, the hypothalamus determines the increase or decrease in the hormone of any gland in the blood, and its amount is regulated through the pituitary gland. One of the hormones of the anterior pituitary gland is somatotropic growth hormone. This hormone affects the development of growth. It has been proven that there is a center in the hypothalamus that regulates sexual behavior. Studies show that puberty in children is associated with the activity of this center.

Summarizing the above, I would like to say once again that the period of adolescence differs sharply from other age periods due to its specific features. Turning to the physiological and psychological characteristics of adolescents, teachers and parents should direct their conflicting forces in a useful direction. This requires great skill and effort from them. Teenagers should treat their teacher and parents as friends and be able to turn to them with any question.

RESEARCH METHODS / МЕТОДИ ДОСЛІДЖЕННЯ

In order to study the various processes and functions of a living organism in physiology, methods of observation and experiment are used. Observation is a method of obtaining information by direct, as a rule, visual registration of physiological phenomena and processes occurring under certain conditions.

At the time of the study, we had a question: do teachers take into account the physiological characteristics of students, especially adolescents, in the

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learning process in the context of the ongoing educational reform? And if so, what methods and means do they use to engage students in learning? How successful are the methods and means they use?

In order to comprehensively study the level of consideration of the physiological characteristics of adolescents in training, pedagogical research methods were applied in a comprehensive manner. To this end, adolescents were studied not only at school, but also at various events, in society, and they listened to the opinion of school psychologists.

In adolescence, the mental ability of students becomes more stable and systematic, memory, voluntary attention, abstract thinking, and imagination develop. Thus, the teenager is not satisfied only with the book and the teacher's explanations, he shows a tendency to independent thinking, search, research. And from this point of view, a lesson conducted by traditional methods is literally uninteresting for a teenager. In such classes, they prefer to work on the problem situation themselves, rather than listen to the teacher. That is why it is more appropriate for the student to determine what is good and what is bad, using different teaching methods.

RESULTS OF THE RESEARCH / РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

One of the main tasks facing pedagogical science, which is engaged in the upbringing, training and education of the younger generation, is to study and generalize the ways of development of the general education school, the education system, the theory of education, to determine the achievements achieved, and at the same time to identify the existing shortcomings and improve them again. means to prevent this from happening again. The general conclusion of the study allows us to come to the following results:

- the study of scientific, pedagogical and methodological literature on the issues of taking into account the physiological characteristics of students in the educational process has shown that so far the problem has not been systematically studied, and the problem has not been solved in a comprehensive manner;
- the results of observations and lessons learned show that teachers' ignorance of the patterns of growth and development processes that reflect the main direction of life of children and adolescents, the anatomical and physiological characteristics of children, leads to an incorrect establishment of teacher-student relationships, a decrease in students' interest in lessons, the occurrence of cases of mental fatigue in children. This is due to the lack of recommendations regarding the professionalism of teachers in this area and taking into account the physiological characteristics of children in the learning process;

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- in the course of research it was found that ignoring the anatomical and physiological characteristics of adolescents in the classroom has a negative effect on strengthening the child's body, physical development, increasing efficiency, and leads to a decrease in students' interest in learning.

CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH / ВИСНОВКИ ТА ПЕРСПЕКТИВИ ПОДАЛЬШИХ ДОСЛІДЖЕНЬ

Changes in the content of general education are associated with an increase in the quality and effectiveness of general education in accordance with the development of society. In modern times, it is necessary to give priority to the development of such abilities as creating conditions for the physical and moral healthy growth of adolescents in the learning process, taking into account their interests and desires, summing up, summarizing and evaluating events occurring in the educational process, in the world around them, approaching them critically and making the right decisions.

Listening to the lessons of teachers, the results of a survey conducted with them and students, and conversations with teachers made it possible to draw the following conclusions:

- as a result of taking into account the anatomical and physiological characteristics of adolescents in biology lessons, students' interest in learning, their level of knowledge and skills, activity in the educational process, and a tendency to creative work increase;
- some biology teachers find it difficult to take into account the anatomical and physiological characteristics of adolescents in the classroom, their professionalism in this area is not sufficiently formed, they do not skillfully use the available resources;
- meetings, conversations with subject teachers, school directors, analysis of the surveys conducted show that the issue of taking into account the physiological characteristics of adolescents in the educational process has not yet been adequately comprehended by teachers. The idea of which teacher will learn more material for the student is still relevant. In order to eliminate this, it is necessary to carry out work on the training of teachers.

Prospects for further research in this direction. Based on the results of the study, a number of recommendations can be made:

1. Accounting for the anatomical and physiological characteristics of adolescents should be carried out at a high level. Taking into account physiological characteristics in the classroom and extracurricular activities should be the focus of attention of teachers and educators.

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2. For the successful implementation of the task, teachers and educators must acquire the appropriate physiological knowledge.

3. Given the physiological characteristics of adolescents, it is advisable to use interactive teaching methods.

4. Best practices for problem solving should be studied and disseminated.

5. Prepare and publish scientific and methodological literature on solving the problem. More research needs to be done in this area.

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УРАХУВАННЯ ФІЗІОЛОГО-АНАТОМІЧНИХ ОСОБЛИВОСТЕЙ ПІДЛІТКІВ ПІД ЧАС ВИКЛАДАННЯ БІОЛОГІЇ

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Анотація. Після здобуття Азербайджаном незалежності, заходи, вжиті у процесі демократизації нашого суспільства, відкрили широкі можливості для появи сучасних ідей у сфері освіти, вивчення міжнародного досвіду, оновлення освіти за формою та змістом. Освіта – основна справа для нашого народу, тому освіта завжди має бути на першому місці в державі. Це підтверджує той історичний період, в якому ми живемо. Одним із головних завдань сьогодення є серйозне заняття навчанням і вихованням підлітків. З цього погляду кожен учитель має глибоко засвоїти закономірності процесів зростання й розвитку, які відображають головну спрямованість життєдіяльності дітей і підлітків, налагодити відповідні взаємини вчителя і учня, тому тільки вихователі, які знають анатомію і фізіологію організму дитини на належному рівні можуть підвищити ефективність навчання, крім розвитку її розумових здібностей. У різних навчальних ситуаціях учитель має вміти вибрати відповідний засіб для досягнення успіху. Враховуючи особливості, характерні для кожного вікового періоду учнів у освітньому процесі, за умови правильного використання навчальних стратегій у процесі викладання предмету можна усунути стани розумової втоми учнів, розвинути їх мислення та дослідницькі здібності, підвищити інтерес до освіти. Такий підхід до навчання розвиває в учнів мисленнєві здібності та вміння самостійно здобувати знання. У цьому напряму перед закладами освіти поставлено важливі завдання. Відомо, що обсяг і зміст матеріалу, який висвітлюється в освітньому процесі, є масивним, тобто не враховуються здібності студентів. Останнім часом сучасні тренувальні технології застосовуються без проведення фізіологічних досліджень. Враховуючи суть змін, що відбуваються в організмі учнів, типові для підліткового віку емоційність, шаленість, нетерплячість, неврахування деякими

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вчителями індивідуального характеру аналізо-синтезної та інтегративної діяльності мозку призводять до напруги як процесу навчання та у стосунках учитель-учень.

Ключові слова: фізіологія; анатомія; навчання; освіта; процес; діяльність; студент; викладач; підлітковий вік; організм; особливості.

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