REVIEW ARTICLES

Features of thinking and physical education of humanitarian universities students: a review article

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Abstract

Physical education in a higher educational institution should be based on the patterns of professional training of students. That's why the selection of means and methods of physical education of students according to the characteristics of their higher nervous activity deserves special attention. Purpose of the study: to determine whether there are features of higher nervous activity of students of humanitarian specialties and to determine the main directions of motor activity according to the characteristics of higher nervous activity of students of humanitarian specialties.

Material and methods
The literature analysis was carried out based on a search in the scientometric databases Scopus and Web of Science, as well as on the basis of data analysis in the PubMed and Google scholar searches. The search was carried out using the keywords “psychophysiology”, “higher nervous activity”, “psychological types”, “students”, “humanitarian specialties”, “technical specialties”, “physical education”. The search was carried out as follows. First, one of the keywords was entered, then the search was refined using other keywords. In total, out of 1345 sources, 26 were selected that were most relevant to the topic of our research.

Results
It has been established that the problem of increasing the level of professionalism in any type of activity, including in the humanitarian professions, requires high levels of health and the presence of certain psychophysiological properties and characteristics of thinking. In this regard, physical education at universities should combine physical training, psychological, and intellectual development of students. The presence of certain features in the processes of higher nervous activity among representatives of humanitarian and technical specialties is shown: humanitarian professions require greater development of the artistic type of thinking, and technical professions require greater development of the logical type of thinking. The artistic type of thinking is also associated with medium and high mobility of nervous processes. Physical exercises for combining professional and physical improvement should be selected in this way, that the students liked them (corresponded to the peculiarities of their nervous activity).

Conclusions
Based on the characteristics of higher nervous activity of students of humanitarian specialties (the predominance of the artistic type), the following recommendations can be given regarding the use of means and methods of physical education: the use of aerobic-anaerobic exercises that require the mobility of the nervous system in combination with the general endurance of the body. Such exercises include team sports, martial arts, walking or running at a variable pace, gymnastic exercises of various types and others.

Keywords
students, physical education, higher nervous activity, psychophysiology

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Анотація

Ярослава Бережна, Жаннета Козіна, Маріан Крету, Ратко Павлович. Особливості мислення та фізичне виховання студентів гуманітарних університетів: оглядова стаття

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<td>Матеріал і методи</td>
<td>Аналіз літератури проводився на основі пошуку в наукометричних базах Scopus and Web of Science, а також на основі аналізу даних у пошуку PubMed та Google scholar. Пошук проводився за ключовими словами &quot;психофізіологія&quot;, &quot;вища нервова діяльність&quot;, &quot;психологічні типи&quot;, &quot;студенти&quot;, &quot;гуманітарні спеціалізовані дисципліни&quot;, &quot;фізичне виховання&quot;. Пошук проводився так. Спочатку вводилося одне із ключових слів, потім проводилось уточнення у пошуку за іншими ключовими словами. Загалом із 4649 джерел було обрано 38, які найбільше відповідали темі нашого дослідження.</td>
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<td>Встановлено, що проблема підвищення рівня професіоналізму у будь-якому виді діяльності, у тому числі й у гуманітарних професіях, потребує високих показників стану здоров’я та наявності певних психофізіологічних властивостей та особливостей мислення. У зв’язку з цим фізичне виховання в університетах має поєднувати фізичну підготовку, психологічний, інтелектуальний розвиток студентів. Показано наявність певних особливостей у процесах вищої нервової діяльності у представників гуманітарних та технічних спеціалізованій: гуманітарні професії потребують більшого розвитку художнього типу мислення, а технічні професії потребують більшого розвитку логічного мислення. Художній тип мислення пов’язаний також із середньою та високою рухливістю нервових процесів. Фізичні вправи для поєднання професійного та фізичного вдосконалення потрібно підбирати таким чином, щоб вони подобались студентам (відповідали особливостям їх нервової діяльності).</td>
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<td>На основі особливостей вищої нервової діяльності студентів гуманітарних спеціальностей (переважання художнього типу) можуть бути надані такі рекомендації щодо застосування засобів та методів фізичного виховання: застосування вправ аеробно-анаеробного характеру, що потребують рухливості нервової системи у поєднанні із загальною витривалістю організму. До таких вправ належать ігорні види спорту, единоборства, ходьба чи біг у змінному темпі, гімнастичні вправи різноманітного характеру та інші.</td>
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<td>Ключові слова</td>
<td>студенти, фізичне виховання, вища нервова діяльність, психофізіологія</td>
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Introduction

According to the majority of experts in the field of physical education in universities [1–4], physical education in a higher educational institution should be based on the patterns of professional training of students. A number of authors [3–6] believe that the basis of professional training is a harmonious combination of physical, psychological and intellectual development.

In this regard, Ilinskaya, et.all [7], Kozin, et.all [8] note that physical education at a university, including the humanities, should, on the one hand, be subject to the principles of sports improvement, and, on the other hand, promote the growth of professionalism in the chosen type of activity and rely on the personal characteristics of university students in the profile being studied.

Other authors [9–13] emphasize that physical education at the university should serve the purpose of strengthening the health of students, since health is the basis of both professional improvement and sports growth.

In this regard, it is appropriate to consider the opinions of different experts regarding the issue of a harmonious combination of various aspects of development - mental and physical. Many authors [4–7], considering the issue of harmonious human development, note that the modern world requires not only a high level of physical fitness, but also the development of the psyche and intellect. People with high levels of physical condition, intelligence and mental abilities reach the heights of world significance in almost all fields, including the humanities. Therefore, most experts in this field [4, 5] recommend developing physical qualities along with mental and mental qualities. This issue concerns, first of all, student youth - the basis of the future society [16, 17]. In this regard, let us consider the historical foundations of the harmonious development of man.

According to historical literary data [4, 5, 15], in ancient times, when life depended on the development of physical qualities, technical skills and abilities, physical education was given the utmost importance. “He can neither read nor swim,” they said in Ancient Greece, wanting to emphasize the complete failure of man [4, 5, 15].

The problem of the harmonious unity of mental and physical development was raised during antiquity, the Middle Ages, and the Renaissance [4, 5]. This idea was developed in the 19th and 20th centuries and the development of the physical education system [4, 5, 15]. This problem is of particular relevance at the present time, when, on the one hand, the mental and mental stress of students is growing, and, on the other hand, sport is becoming more and more professional, and less and less opportunities remain for the use of physical education and sports as a means of harmonization.

Researchers of the peculiarities of the structure of physical education classes in universities [2] note that this problem is becoming increasingly relevant for young students, among whom students of humanities universities occupy a special place. This is exactly the contingent that is characterized by a large amount of work that requires high concentration, attention, memory, and painstakingness. This type of mental work is one of the most tiring, and, naturally, must be harmoniously combined with physical activity, which provides sufficient stress on both the cardiovascular and respiratory systems, and on the musculoskeletal system.

Summarizing the analysis of literary data on the issue of harmonious human development, it can be noted that most authors [10–14, 16, 18] are unanimous in the opinion that when considering a person’s future professional activity, it is imperative to take into account his state of health. In this regard, improvement requires both the physical condition of a person and the level of development and effectiveness of the professional use of his humanitarian, mathematical and other abilities.

Experts [14, 16, 18], who have studied the optimal ways to form a high-level professional in any type of activity, indicate that the first steps towards the future professionalism of an employee begin with his training in the profession, i.e. during the period of study at a higher educational institution. Emphasizing the connection between health and future professional activity, Hao, et.all [11] note that physical health reflects the degree of physical development of a student, his motor skills and abilities, which allows him to most fully realize his creative potential. Physical health is not just a desirable quality of a future specialist, but a necessary element of his personal structure, a necessary condition for the construction and development of social relations. The classic and rather comprehensive definition of health as physical, mental and social well-being needs correction when it comes to professional health [158]. In this case, the indicators (elements) of psychophysical connection that provide mutual
the action of the biological component and the socio-
technical environment.

At the same time, some authors [1, 3, 13, 14] draw attention to the fact that health is the “most important” aspect of professionalism, others [17, 18] that it is reflected in the “psychophysical readiness of a specialist” and consists of the following components: sufficient professional ability to work; the presence of the necessary reserves of physical and functional capabilities of the body for timely adaptation to rapidly changing conditions of the production and external environment, volume and intensity of work; ability to fully recover within a given time limit; the presence of motivation in achieving the goal [4, 5, 8]. All these conditions can be realized with a sufficient level of physical activity among students - future professionals.

Despite all the obvious need for physical activity, the question remains open what type of physical activity is best for students of humanities universities.

Some authors [6–8] point out that every student who is aware of the need for physical exercise chooses a sport that is more suitable for him than others. And a fairly large percentage of students choose team sports. This is not accidental, since sports and outdoor games captivate students emotionally, developing not only physical and emotional capabilities, but also intellectual and psychological ones [18–21]. And this is most relevant for students of all specialties, including the humanities.

In this regard, summarizing the opinions of leading experts [20, 21] on this issue, it is logical to conclude that physical education at universities, on the one hand, should contribute to strengthening the health of students and their professional improvement, and, on the other hand, like any motor activity should be enjoyable.

Authors who have studied the specifics of the impact of any physical activity on a person [22, 23] note that many types of physical activity meet the requirements for improving professional skills in various specialties, since they develop both physically and intellectually, mentally, aesthetically [4, 5, 7, 8].

However, analyzing the current state of the issue of constructing the educational and training process in physical education at universities, a number of authors [8, 24, 25] note that currently there are two extremes: athletes either train in an almost maximum mode, which interferes with professional improvement in chosen specialty, or no attention is paid to the competent construction of the educational and training process. And, thus, the indicated contradiction between the purpose of sports training and the need for improvement in the chosen professional activity is not currently being resolved in full.

Therefore, as the authors point out [4, 5, 6], physical education at universities should be based on the position that there is a close connection between the mental and physical development of a person. Physical education in universities should strengthen this connection, and its violation is not natural. Another important aspect is the correspondence of the means and methods of physical education to the characteristics of the higher nervous activity of students.

However, the issue of the characteristics of physical education in humanitarian universities according to the psychophysiological characteristics of students is not covered in modern literature, and therefore requires detailed study and practical testing. The selection of means and methods of physical education of students according to the characteristics of their higher nervous activity deserves special attention.

**Purpose** of the study: to determine whether there are features of higher nervous activity of students of humanitarian specialties and to determine the main directions of motor activity according to the characteristics of higher nervous activity of students of humanitarian specialties.

**Material and methods**

The literature analysis was carried out based on a search in the scientometric databases Scopus and Web of Science, as well as on the basis of data analysis in the PubMed and Google scholar searches.

The search was carried out using the keywords “psychophysiology”, “higher nervous activity”, “psychological types”, “students”, “humanitarian specialties”, “technical specialties”, “physical education”. The search was carried out as follows. First, one of the keywords was entered, then the search was refined using other keywords. For example, 4649 sources were found for the keywords “types of higher nervous activity”; when refining the search using the keyword “typological features”, 8 sources were found; when refining the search using the keyword “students,” 53 sources were found; By refining the search for the word “Pavlov theory,” 88
sources were found. In total, out of 4649 sources, 38 were selected that were most relevant to the topic of our research.

The criteria for selecting literary sources were as follows: 1 – preference was given to sources with the most her advising search keywords; with the same importance of sources according to keywords, preference was given to those that were published over the past 5 years, as well as articles published in publications of quartiles Q1-Q2.

Results

Developing the opinion of scientists on this issue [8, 12, 23, 24], it should be noted that an increase in mental and mental stress without optimal compensation by physical activity leads to a significant deterioration in general health, which, in turn, affects professional training, as can be seen from our proposed diagram presented in Figure 1. On the other hand, an excessive increase in physical activity without compensation by intellectual development leads to insufficient control of consciousness by physical activity, which leads to physical fatigue and wear and tear of the body (Figure 1).

Fig. 1. Scheme of the relationship between mental and physical development (source: drawing by the authors)
The selection of physical exercises that are suitable for people with a certain type of higher nervous activity is relevant for solving two problems simultaneously: professional improvement of a person and strengthening his health. Currently, there is conflicting data in the literature regarding the presence of certain features in the thinking and perception of the world of representatives of the humanitarian and technical professions. Most authors [3, 9, 10, 11], when analyzing the features of physical education at universities, do not take into account the features of the professional orientation of the university at all.

However, when considering the issue of the characteristics of physical education at universities, we consider it necessary to analyze the results of research by different authors on possible differences in the way of thinking and perception of people with a humanitarian and technical mindset from the standpoint of physiology and psychology, since these differences can be the basis for constructing a certain category of both the learning process in general and the basketball educational and training process in particular.

Currently, there are several definitions of the concept of “thinking”. Humans are characterized by a higher cognitive process called thinking [9–13]. According to a number of experts in the field of psychophysiology [26, 27, 28], thinking can often be associated with common sense and intuition. In reality, it has nothing to do with either one or the other. It represents the ability to learn, to solve a given problem. Thinking is the generation of new knowledge, an active form of creative reflection and transformation of reality by man. It generates a result that does not exist either in reality itself or in the subject at a given moment in time [27, 29].

The authors [26–28] also point out that thinking, unlike perception, goes beyond the limits of sensory data and expands the boundaries of knowledge. In thinking based on sensory information, certain theoretical and practical conclusions are made. It reflects existence not only in the form of individual things, phenomena and their properties, but also determines the connections that exist between them, which most often are not given directly to man in his very perception. The properties of things and phenomena, the connections between them are reflected in thinking in a generalized form, in the form of laws and entities. In practice, thinking as a separate mental process does not exist; it is invisibly present in all other cognitive processes: perception, attention, imagination, memory, speech. The highest forms of these processes are necessarily associated with thinking, and the degree of its participation in these cognitive processes determines their level of development.

Based on the above, we can conclude that thinking is the process of producing conclusions with logical operations on them.

Pavlov's conclusion [26–28] about specifically human types of higher nervous activity is important: the relative predominance of the first or second signal system in individual manifestations of human higher nervous activity gave Pavlov the basis for distinguishing “artistic” and “mental” types [26–28]. The peculiarities of the interaction of two signaling systems are most clearly revealed in the extreme representatives of these types. The “artistic” type is characterized by increased sensitivity to stimulation through the first signaling system: the richness and brightness of direct impressions delivered by the senses distinguish representatives of this type. On the contrary, the “thinking” type is characterized by the ability and tendency to abstract thinking [26–28, 29, 30]. Thus, the thinking type is an individual in whom the second signaling system prevails over the first signaling system. Such a person perceives the world around him abstractly, with a tendency to deeply generalize signals from the external environment.

Modern research [31, 32] has established that the neurophysiological basis of abstract thinking is the relatively greater functional significance of the frontal cortex of the cerebral hemispheres, as well as the relative predominance of the activity of the left hemisphere compared to the right. The artistic type is an individual in whom the first signaling system prevails over the second signaling system. Such a person perceives the world around him figuratively, without a tendency to generalize its phenomena. The neurophysiological basis of imaginative thinking is the comparatively lower functional significance of the frontal cortex of the cerebral hemispheres, as well as the relative predominance of the activity of the right hemisphere compared to the left [33, 34, 35]. According to the results of experimental studies by the authors [36, 37, 38], many people should be classified as an average type, harmoniously combining the action of both signaling systems.

**Discussion**

The goal set in this study was achieved. We found that in a number of literary sources there
are indications that representatives of humanitarian specialties differ in a predominance of imaginative thinking, while representatives of technical specialties are distinguished by a predominance of logical thinking. However, there is relatively little experimental evidence for this statement. The authors, analyzing this issue, are based on a theoretical substantiation of the position about the predominance of different types of higher nervous activity of representatives of the humanitarian and technical professions.

A number of authors [28, 29, 35] identify several types of thinking. Theoretical conceptual thinking is such thinking, using which a person, in the process of solving a problem, refers to concepts, performs actions in the mind, without directly dealing with the experience gained through the senses. He discusses and searches for a solution to a problem from beginning to end in his mind, using ready-made knowledge obtained by other people, expressed in conceptual form, judgments, and inferences. Theoretical conceptual thinking is characteristic of scientific theoretical research [36, 37].

Theoretical figurative thinking differs from conceptual thinking in that in this case the material that a person uses to solve a problem is not concepts, judgments or inferences, but images. They are either directly retrieved from memory or creatively recreated by the imagination. This kind of thinking is used by representatives of literature, art, and in general people of creative work who deal with images. In the course of solving mental problems, the corresponding images are mentally transformed so that a person, as a result of manipulating them, can directly see the solution to the problem he is interested in [26–28].

A distinctive feature of the next type of thinking - visual-figurative - is that the thought process in it is directly related to the thinking person’s perception of the surrounding reality and cannot be accomplished without it. Thoughts are visual and figurative, a person is tied to reality, and the images themselves necessary for thinking are presented in his short-term and operative memory (in contrast, images for theoretical figurative thinking are extracted from long-term memory and then transformed) [26–28].

Many authors [32, 33, 36] believe that the listed types of thinking act simultaneously as levels of its development. Theoretical thinking is considered more perfect than practical thinking, and conceptual thinking represents a higher level of development than figurative thinking. In everyday practice, it was noted that, for example, visual-effective thinking is found among people engaged in real production work, and visual-figurative thinking is found among people who have to make decisions about the objects of their activity only by observing them but without directly touching them. Theoretical conceptual thinking is the thinking of a scientist. The dominant property of thinking, of course, leaves its mark on the individual, therefore, long before the identification of these properties by psychological science, they were noted in everyday practice. However, there is also a point of view [8] that all types of thinking are equally significant for the existence of humans as a biological species.

In this regard, it is very problematic to identify the noted types of thinking “in their pure form.” Apparently, the higher the thinking abilities of a person (brain), the subtler and deeper the interaction of different mental forms in his brain. The first and second signaling systems, the physiological basis of which are the right and left hemispheres of the brain, also show sensitivity to different types of information flows [26]. The special quality of signaling systems includes the difference in functions in the process of cognition, which determines the use of different means and strategies of reflection [27]. Two signaling systems ensure the simultaneous existence of a person in two worlds - real and symbolic, visible and known, perceived and understood.

The orientation of the first signaling system to the visible world, and the second to the known, symbolic world, the qualitative separation of information flows and the corresponding division of functions in a single process of cognition establish a relationship of complementarity and cooperation between the systems, thereby ensuring the integrity of the individual’s life activity.

As the authors note [28, 29], in evolutionary development, incompatible information flows lead to the differentiation of nervous tissue into separate brain systems, the morphophysiological relations between which correspond to the relations between information flows (in content), i.e. can enter into a variety of relationships - from complementary to reciprocal.

In general, we can say that what is common to all information brain blocks is that they provide flexibility and dynamism in the relationship between the physical properties of objects and their meaning in the changing conditions of interaction between the individual and the environment.
Differentiation of the nervous system, which occurs according to a block-level principle common to all living organisms, is apparently at the same time the main source of individual psychological differences [33, 34, 35].

Thus, as indicated by the author [8], representatives of technical sciences gravitate towards the thinking type, and representatives of the humanities are closer to the artistic type. This conclusion of the author [8] is also confirmed by literary data on the connection between certain aspects of linguistic activity (speech understanding, speaking skills) with the activity of the right hemisphere [34, 35], and mathematical abilities with the activity of the left hemisphere. Individual differences, determined by the paired work of the brain hemispheres, can be reflected in the ratio of the success of learning in linguistic and historical subjects, which form the core of the humanities cycle, with the success of learning in the main subjects of the natural cycle (algebra, geometry, physics). The data of these authors is also confirmed by the fact that the main differences between representatives of technical and humanities sciences are also revealed in verbal tests, where a group of humanities students demonstrate greater success. Representatives of technical sciences cope better with arithmetic problems.

From the literature we know about the connection between professional inclinations and asymmetry of hemispheric activity. A study of students specializing in literature and the humanities showed a predominance of right hemisphere activity, while students specializing in natural sciences and technology showed a predominance of left hemisphere activity [30, 31]. In other work, also conducted on students, it was shown that the level of verbal ability is positively correlated with the level of knowledge in humanities subjects (0.42), social sciences (0.57) and science subjects (0.28); the lowest correlation coefficient was obtained for natural sciences [34, 35].

As a kind of “neurophysiological control” in the study [7, 8], parameters of the properties of the nervous system were taken. The combination of activation and mobility of the nervous system turned out to be characteristic of the humanities, which constitutes the natural basis of the artistic type. For representatives of technical sciences, this is a combination of high stability (endurance), low mobility, inertia and inactivation, to a greater extent than other combinations of properties, contributes to the formation of the “thinking” type. As the author [36] points out, temperamental traits that develop under the influence of the properties of the nervous system and cognitive characteristics of specifically human types of higher nervous activity form a kind of emotional-cognitive complexes.

Thus, the research of modern scientists confirms Pavlov’s hypothesis [24–26] that the extreme poles of specifically human types should correspond to the extreme general types of higher nervous activity, however, at the moment, scientifically based recommendations have not yet been developed regarding the features of constructing the pedagogical process with representatives of various types of thinking. To a large extent, this provision also applies to the educational and training process in physical education at universities.

Based on the characteristics of higher nervous activity of students of humanitarian specialties (the predominance of the artistic type), the following recommendations can be given regarding the use of means and methods of physical education: the use of aerobic-anaerobic exercises that require the mobility of the nervous system in combination with the general endurance of the body. Such exercises include team sports, martial arts, walking or running at a variable pace, gymnastic exercises of various types and others. However, the issue of taking into account the characteristics of the type and characteristics of thinking in the physical education of students of humanities has not been considered in currently available scientific research. Therefore, the development of these provisions requires additional experimental research and theoretical justification.

Conclusions

1. It has been established that the problem of increasing the level of professionalism in any type of activity, including in the humanitarian professions, requires high levels of health and the presence of certain psychophysiological properties and characteristics of thinking. In this regard, physical education at universities should combine physical training, psychological, and intellectual development of students.

2. The presence of certain features in the processes of higher nervous activity among representatives of humanitarian and technical specialties is shown: humanitarian professions require greater...
development of the artistic type of thinking, and technical professions require greater development of the logical type of thinking. Modern authors identify several interrelated types of thinking, properties of the nervous system and a propensity for humanitarian or technical activities. The combination of activation and mobility of the nervous system turned out to be characteristic of humanists, which constitutes the natural basis of the artistic type of higher nervous activity. For representatives technical sciences is a combination of high stability (endurance), inactivation and inertia of the nervous system, which distinguishes the mental type of higher nervous activity.  
3. Based on the characteristics of higher nervous activity of students of humanitarian specialties (the predominance of the artistic type), the following recommendations can be given regarding the use of means and methods of physical education: the use of aerobic-anaerobic exercises that require the mobility of the nervous system in combination with the general endurance of the body. Such exercises include team sports, martial arts, walking or running at a variable pace, gymnastic exercises of various types and others. However, the issue of taking into account the characteristics of the type and characteristics of thinking in the physical education of students of humanities has not been considered in currently available scientific research. Therefore, the development of these provisions requires additional experimental research and theoretical justification.

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