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ORCID 0000-0001-6333-5519

ЗМІСТ ПРИРОДНИЧО-НАУКОВОЇ ПІДГОТОВКИ МАЙБУТНІХ ФАХІВЦІВ З ЛІКУВАЛЬНОЇ ФІЗКУЛЬТУРИ ТА ЕРГОТЕРАПІЇ НА ПОЧАТКОВОМУ (ТЕОРЕТИЧНОМУ) ЕТАПІ НАВЧАННЯ

Анна Фастівець,

кандидатка педагогічних наук, доцентка кафедри соціально-гуманітарних дисциплін та фізичної терапії, ерготерапії; Полтавський інститут бізнесу закладу вищої освіти «Міжнародний науково-технічний університет імені академіка Юрія Бугая».

У статті узагальнено нормативно-правове забезпечення природничо-наукової підготовки майбутніх фахівців із фізичної терапії й ерготерапії в сучасному ЗВО. Здійснено структурний аналіз змісту природничо-наукової підготовки майбутніх фахівців із фізичної терапії та ерготерапії на початковому (теоретичному) етапі підготовки. Системне дослідження навчальних дисциплін природничо-наукової підготовки майбутніх фахівців із фізичної терапії та ерготерапії дає змогу виявити їх значну кількість, наявність частих повторів однотипної інформації і ситуаційних завдань, тобто, постає завдання взаємоузгодження змістового складника підготовки, модернізації природничо-наукової підготовки й оптимізації на основі структурного аналізу. Наведено результати структурного аналізу змісту природничо-наукової підготовки майбутніх фахівців із фізичної терапії та ерготерапії на початковому (теоретичному) етапі підготовки. Проаналізовано професійно-орієнтований зміст природничо-наукових дисциплін («Біохімія», «Анатомія людини», «Фізіологія людини», «Вікова анатомія та фізіологія», «Фізіологія рухової активності», «Основи гігієни та екології», «Біомеханіка», «Загальна теорія здоров'я, діагностика і моніторинг стану здоров'я») та визначено їх спрямованість на формування складників природничо-наукової компетентності фахівця фізичної терапії та ерготерапії.

Організація природничо-наукової підготовки шляхом упровадження методики формування професійної компетентності майбутніх фахівців із фізичної терапії й ерготерапії інтегрує практико-орієнтовані прийоми навчання й спрямована на реалізацію визначених педагогічних умов. Варто зазначити, що в процесі природничо-наукової підготовки визначені педагогічні умови реалізуються на основі врахування особливостей функціонування цілісної інтеграційної системи та шляхом упровадження початкового (теоретичного), базового (практико-орієнтованого) і підсумкового (професійно-адаптивного) етапів підготовки.

Ключові слова: майбутній фахівець із фізичної терапії та ерготерапії, природничо-наукова підготовка, природничо-наукова компетентність, етапи формування компетентності.

Formulation of the problem. We conducted a structural analysis of the set of discipline programs of normative and selective parts of natural and scientific training of future specialists in physical therapy and ergotherapy basing on an algorithm that allowed us to unify the requirements for natural and scientific discipline programs and to develop a multi-subject matrix of the content of this training. The algorithm considers the following components: the name of the discipline; the number of hours allocated to its mastery; the total number of ECTS credits; the status of the discipline (compulsory or optional); distribution of hours allocated to lectures,

practical, seminar classes; number of hours of independent and individual work; form of control (test / exam); the number of content modules and their names; characteristics of the previous conditions of assimilation; purpose and objectives of the course; requirements for knowledge and skills of future specialists; forms and methods of education; evaluation and control of knowledge.

At the initial (theoretical) stage of professional training of future specialists in physical therapy and ergotherapy, eight natural and scientific disciplines are studied: «Biochemistry», «Human Anatomy», «Human Physiology», «Age Anatomy and Physiology», «Physiology of Motor Activity», «Fundamentals of Hygiene and Ecology», «Biomechanics», «General Theory of Health, Diagnostics and Health Monitoring». At the basic (practically oriented) stage of training of future specialists in physical therapy and ergotherapy, six natural and scientific disciplines are studied: «Functional Diagnostics», «Psychology of Health and a Healthy Lifestyle», «Theory of Health-Improving Nutrition», «Psychophysiology», «Metrological Control», «Biological Aspects of Physical Therapy and Ergotherapy». At the final (professional and adaptive) stage of professional training of future specialists in physical therapy and ergotherapy, three disciplines are studied: «Modern Medical and Biological Methods of Restoring the Functional State in Physical Culture, Sports and Rehabilitation», «Information and Communication Technologies in Natural and Scientific Training» and «Natural and Scientific Foundations of Health Keeping». General methodical aspects of natural and scientific disciplines teaching according to different stages of training are disclosed in subsection 2.3. of our research.

Analysis of recent publications and research. The scientific works of many researchers are devoted to the study and improvement of the process of professional training of future specialists in physical therapy and ergotherapy. In particular, scientists revealed the key aspects of the professional training of future specialists in physical therapy and ergotherapy (V. Kuksa, R. Maslov, L. Sushchenko, etc.), studied the foreign experience of specialists training in this field (O. Bazylchuk, A. Hertsyk, S. Huk, Y. Liannoi, etc.), the conceptual apparatus in the field of physical therapy, ergotherapy, and physical rehabilitation was generalized (A. Hertsyk, O. Huzii, O. Merzlikina, etc.) and the problem of formation of readiness for various types of professional activity was investigated (N. Bielikova, O. Mikheienko, M. Spivak, etc.).

The purpose of the article is a structural analysis of the content of natural and scientific training of future specialists in physical therapy and ergotherapy at the initial (theoretical) stage of training.

Presentation of the main material. The initial (theoretical) stage covers the 1st and 2nd courses of training of future specialists in physical therapy and ergotherapy and involves the study of a number of natural and scientific disciplines, including «Biochemistry», «Human Anatomy», «Human Physiology», «Age Anatomy and Physiology», «Physiology of Motor Activity», «Fundamentals of Hygiene and Ecology», the discipline of independent choice of the educational institution, which is «Biomechanics», as well as the discipline of free choice of applicants of higher education, which is «General Theory of Health, Diagnostics and Health Monitoring». That is, at the initial stage, future specialists study a total of 8 natural and scientific disciplines, most of which, according to the curriculum, are included into the normative cycle of general training.

The subject of the academic discipline «Biochemistry» is the study of the chemical composition of the human body, the patterns and regulation of the main biochemical processes in the cell, in particular, such aspects as the regulation of fermentative activity and modern methods of biological macromolecules research. The purpose of studying the academic discipline «Biochemistry» is the assimilation of knowledge about biochemical processes by the applicants of higher education, in particular, about the peculiarities of their regulation in the human body, which form the content of the training of specialists in physical therapy and ergotherapy. In the system of natural and scientific training of future specialists in physical therapy and ergotherapy, the study of one content module «Static and dynamic Biochemistry» is provided. In the structure of the indicated module, we offer the following topics for study: «Water in living systems»,

«Carbohydrates. Structure, properties and biological role», «Carbohydrate metabolism», «Lipids. Structure, properties and biological role», «Lipid metabolism», «Proteins and nucleic acids. Structure, properties and biological role», «Proteins and nucleic acids metabolism», «Ferments» (Parkhomenko, 2019).

The study of Biochemistry is necessary for the formation of creative thinking of the future physical therapist and ergotherapist, which is necessary for successfully mastering of professionally oriented disciplines. In the process of this educational discipline studying, applicants of higher education learn to explain the peculiarities of the structure and transformations of bioorganic compounds in the human body; analyze the correspondence of the structure of bioorganic compounds to the physiological functions they perform in the body; explain the existence of a relationship between the structure of bioorganic compounds, the peculiarities of their metabolism and their physiological functions in the body; interpret the biochemical and molecular bases of the physiological functions of cells, organs and systems of the human body; explain the main biochemical mechanisms of pathological processes in the body and the principles of their correction; characterize the peculiarities of the physiological state of the human body and the development of pathological processes on the basis of laboratory studies; to interpret the peculiarities of the structure and transformations of bioorganic compounds in the human body, on which their use in medicine as medicinal products is based; to explain the research methodology and the use of individual biochemical research methods that are the basis of laboratory diagnosis of pathological states (Zaichko, 2013).

The study of the discipline «Human Anatomy» involves the acquisition by applicants of higher education of knowledge about the peculiarities of the structure of organ systems, organs and tissues, as well as establishing the relationship between the structure of organs and the functions they perform. The task of studying the discipline is to form a holistic view of the human body; to get acquainted with the levels of organization of the human body; establish the relationship between the structure of tissues, organs and physiological systems and the functions they perform; to form the concept of interdependence and unity of the structure and function of human organs; strengthen the applied value of anatomical knowledge, which will make it possible to use the volume of knowledge of Anatomy in the practical activities of physical therapists and ergotherapists (Parkhomenko, 2019).

In the process of studying the «Human Anatomy» educational discipline, the formation of the following special (professional, subjective) competence is provided: the ability to analyze the structure, normal and individual development of the human body and its motor functions. Program learning outcomes include: 1) the ability to demonstrate readiness to strengthen and keep personal and public health through the use of human motor activity and conducting explanatory work among patients / clients, their family members, medical professionals, as well as improving the community environment; 2) ability to apply knowledge of biological aspects of physical therapy and ergotherapy into professional activities.

The study of the academic discipline «Human Anatomy» provides future specialists in physical therapy and ergotherapy with knowledge about the structure of the body at various levels of the organization of living matter, from the structure of the body to the disclosure of the regularities of the cell structure, taking into account their historical development, interaction with the environment, age and individual peculiarities. Knowledge of Human Anatomy should form an understanding of the peculiarities of statics and dynamics of the body of applicants of higher education, which is the basis of lost functions restoring and preventive measures.

The purpose of studying the «*Fundamentals of Hygiene and Ecology*» educational course is the assimilation of the system of sanitary and hygienic knowledge, the formation of relevant abilities and skills by the applicants of higher education in the field of physical therapy and ergotherapy. The main tasks of studying the «*Fundamentals of Hygiene and Ecology*» educational discipline include: assimilation of the system of sanitary and hygienic knowledge; formation of abilities and skills aimed at preserving and strengthening of the individual, group and public health (Mohyla, 2019).

Since the study of the academic discipline «*Fundamentals of Hygiene and Ecology*» lays the foundations for students' knowledge of environmental factors and their impact on general

human health, this course is the leading one in the system of natural and scientific training of a specialist in physical therapy and ergotherapy. Mastering the content of the educational discipline provides the rehabilitator with practical skills that are necessary for the implementation of specific preventive measures, regarding the personal hygiene of healthy and sick people, hygiene of nutrition, life, work, upbringing and education of children and adolescents, maintaining the medical and preventive, and rehabilitation facilities in proper sanitary condition, ensuring the radiation safety of patients and staff.

The purpose of studying the «Human Physiology» educational course is the assimilation of future specialists in physical therapy and ergotherapy of theoretical knowledge about the regularities and mechanisms of functioning of individual tissues, organs and systems, as well as the entire human body, as well as the formation of the basis for the creative use of acquired knowledge when studying other related disciplines and in further scientific or practical rehabilitation activities (Parkhomenko, 2019).

The content of the educational material is divided between three content modules:

1) «Physiology of the neuromuscular apparatus», covering the following topics: «Subject, tasks and methodology of human physiology», «General physiological properties of the body», «Physiology of blood. Lymph and intercellular fluid», «Physiological peculiarities of blood circulation of the human body»;

2) «Metabolism and energy supply of muscle activity», which contains the following topics: «Physiology of respiration», «Physiological peculiarities of the digestion process in the human body», «Metabolism and energy exchange in the human body», «Excretion processes»;

3) «Vegetative systems of muscle activity ensuring », which involves the study of the following topics: «Humoral regulation of physiological functions», «Physiology of nerves and muscles», «Physiology of the central nervous system», «Physiology of sense organs», «Physiology of higher nervous activity» (Parkhomenko, 2019).

The purpose of study of the educational course «Biomechanics» is the effective provision of special professional and pedagogical training for applicants of higher education; formation of theoretical knowledge, as well as practical skills and abilities of self-mastery of physical exercises and improvement of motor actions; justification of individual rational models of actions, pedagogical means and programs of motor actions learning and their correction (Khomenko, 2019; Fastivets, 2019).

Among the main tasks of studying the «Biomechanics» academic discipline there is a study of the biomechanical bases of human motor activity, as well as pedagogical means and methods of its optimization with the aim of improving motor actions to achieve the planned results in physical rehabilitation, mastering the skills of independent work with literature.

An analysis of the experience of teaching the «Biomechanics» course in institutions of higher education for future specialists in physical therapy and ergotherapy proves that the most optimal distribution of the educational material is between two content modules:

1) «Fundamentals of theoretical biomechanics», covering the following topics: «Introduction to biomechanics. The use of the basics of biomechanics in the activities of a specialist in physical therapy and ergotherapy», «Biomechanical characteristics of the human body and its movements», «Structure and functions of the biomechanical system of the human musculoskeletal system», «Morpho-functional peculiarities of muscle tissue. Mechanism and energetics of muscle contraction. Regulation of muscle tension», «Biomechanical characteristics of posture», «Biomechanics of motor qualities»;

2) «Biomechanical analysis of motor actions», which involves the study of the following topics: «The concept of the system of movements and the organization of their management», «Fundamentals of differential biomechanics», «Biomechanical characteristics of cyclic kinds of sport», «Biomechanical characteristics of acyclic kinds of sport», «Biomechanical characteristics of sports with a non-standard structure of movements. Biomechanics of sports and technical skills», «Fundamentals of medical and pathological biomechanics», «The influence of static and dynamic work on the functions of the vegetative systems of the sportsman's body».

The «Biomechanics» study course belongs to the basic educational disciplines focused on the professional training of highly qualified specialists in the field of health care. The formation of competencies provided by the program of the «Biomechanics» course gives physical therapy and ergotherapy specialists the opportunity to teach patients (clients) the motor actions, health-improving and therapeutic physical exercises as efficiently as possible.

The educational discipline of the students' choice «*General Theory of Health, Diagnostics and Health Monitoring*» is taught in institutions of higher education in the second semester. The purpose of its teaching is the formation of future specialists in physical therapy and ergotherapy with theoretical knowledge about human health, its physical, psychological, social and spiritual components, as well as methods of scientific cognition of the general theory of health, health itself and its forms (Mohyla, Fastivets, 2019).

The content of the training course is divided between two content modules:

1) «General theory of health», which involves the study of the following topics: «General theory of health as an educational and scientific discipline», «Development of the human model», «System theories with a biological and neurophysiological approach», «Theories of stress and adaptation reactions. Aging theories», «Organism as a system», «New history of medicine: improving the concept of health»;

2) «Diagnostics and health monitoring», which covers the following topics: «Functional diagnostics», «Methods of functional studies», «Research and evaluation of the functional state of the nervous system», «Research of the musculoskeletal system», «Research of typological peculiarities of higher nervous activity and mental processes», «Diagnosis of the level of individual health», «Non-traditional methods of diagnosis» (Mohyla, Fastivets, 2019).

The purpose of studying the «Physiology of Motor Activity» educational course is the assimilation by the higher education applicants of knowledge about the basic regularities of the influence of physical exertions of various nature on the human body, as well as the formation of a scientifically based approach to the development and application of effective rehabilitation means based on the acquired knowledge. The main tasks of studying the «Physiology of Motor Activity» educational course include the mastering of theoretical knowledge about functional changes that occur in all systems during physical education by future specialists, and methods of physical exertion dosing and their adequacy monitoring (Donets, 2019).

We propose to distribute the content of the academic discipline between ten topics, combined into two content modules:

1) «General basics of the physiology of motor activity», which covers the following topics: «Introduction to the discipline «Physiology of Motor Activity», «Adaptation to physical exertions and reserve capabilities of the body», «Functional changes in the body during physical exertions. Physical capacity and methods of its determination», «Physiological bases of fatigue and physiological characteristics of restorative processes», «Physiological bases of health-improving physical culture»;

2) «Physiological peculiarities of motor activity», which provides the study of the following topics: «Physiological classification of physical exercises», «Physiological mechanisms and regularities of the development of physical qualities and motor skills», «Physiological foundations of fitness development», «Physiological peculiarities of the body of preschool and school age children and their adaptation to physical exertion», «Physiological peculiarities of the body of mature and elderly people and their adaptation to physical exertion» (Donets, 2019).

Professional activity of a specialist in physical therapy and ergotherapy involves the work with patients (clients) of different ages, which actualizes the study of the «*Age Anatomy and Physiology*» academic discipline, the purpose of which is to acquaint students with the peculiarities of the formation, development and functioning of organs, organ systems and the entire human body in the process of individual development. The main tasks of studying this course include mastering the knowledge of the theory of the ontogenesis of the human body by applicants of higher education. According to the requirements of the educational and professional program, future specialists should know: age periodization of human ontogenesis;

the main conceptual material of the discipline; characteristics of the development of all systems of human organs and regulatory systems of different age periods; concepts of biological and physiological age, critical stages of ontogenesis. Applicants of higher education should be able to: analyze the structure, normal and individual development of the human body and its motor functions; describe the differences in the anatomical and physiological structure of body systems of different age periods; use methods of statistical analysis of results (Parkhomenko, Fastivets, 2019).

Conclusions. The organization of natural and scientific training through the implementation of the methodics of professional competence formation of future specialists in physical therapy and ergotherapy integrates the practice-oriented teaching techniques and is aimed at the implementation of defined pedagogical conditions. It is worth noting that in the process of natural and scientific training, the specified pedagogical conditions are implemented basing on consideration the peculiarities of the functioning of the holistic integration system and by introducing the initial (theoretical), basic (practically oriented) and final (professionally adaptive) stages of training.

The initial (theoretical) stage covers the 1st and 2nd courses of training of future specialists in physical therapy and ergotherapy and involves the study of a number of natural and scientific disciplines, including «Biochemistry», «Human Anatomy», «Human Physiology», «Age Anatomy and Physiology», «Physiology of Motor Activity», «Fundamentals of Hygiene and Ecology», the discipline of independent choice of the educational institution, «Biomechanics», as well as the discipline of free choice of applicants of higher education, which is «General Theory of Health, Diagnostics and Health Monitoring». That is, at the initial stage, future specialists study a total of 8 natural and scientific disciplines, most of which, according to the curriculum, are included into the normative cycle of general training.

We see the prospects for further research in the development of an integrated methodical system of the formation of natural and scientific competence of future specialists in physical therapy and ergotherapy.

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CONTENT OF NATURAL AND SCIENTIFIC TRAINING OF FUTURE SPECIALISTS IN PHYSICAL THERAPY AND ERGOTHERAPY AT THE INITIAL (THEORETICAL) STAGE OF TRAINING

Anna Fastivets,

Candidate of Pedagogical Sciences,
Associate Professor of the Department of Social and Humanitarian Disciplines
and Physical Therapy, Ergotherapy;
Poltava Business Institute of the Institution of Higher Education «International Scientific and
Technical University named after Academician Yurii Buhai»

The article examines the regulatory and legal provision of natural and scientific training for future specialists in physical therapy and ergotherapy in modern higher education institutions. A structural analysis of the content of natural and scientific training of future specialists in physical therapy and ergotherapy at the initial (theoretical) stage of training has been carried out. A systematic study of the educational disciplines of the natural and scientific training of future specialists in physical therapy and ergotherapy makes it possible to reveal their significant number, the presence of frequent repetitions of the same type of information and situational tasks, that is, the task of mutual coordination of the content component of training, modernization of natural and scientific training and optimization based on structural analysis. The results of the structural analysis of the content of natural and scientific training of future specialists in physical therapy and ergotherapy at the initial (theoretical) stage of training are given.

The professionally oriented content of natural science disciplines («Biochemistry», «Human Anatomy», «Human Physiology», «Age Anatomy and Physiology», «Physiology of Motor Activity», «Fundamentals of Hygiene and Ecology», «Biomechanics», «General Theory of Health, Diagnosis and Monitoring of the State of Health»), and their focus on the formation of the components of the natural and scientific competence of a specialist in physical therapy and ergotherapy is determined.

The organization of natural and scientific training through the implementation of the methodology for the formation of professional competence of future specialists in physical therapy and ergotherapy integrates practice-oriented teaching techniques and is aimed at defined pedagogical conditions implementation. It is worth noting that in the process of natural and scientific training, the specified pedagogical conditions are implemented based on taking into account the peculiarities of the functioning of the integral integration system and by introducing the initial (theoretical), basic (practically oriented) and final (professionally adaptive) stages of training.

Keywords: *future specialist in physical therapy and ergotherapy, natural and scientific training, natural and scientific competence, stages of competence formation.*

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