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Principles of Realization of Physical Therapy for Students: Modern Views of Neuropedagogy and Neuropsychology

Valentyna BILYK[1],
Oksana BASHTOVENKO[2],
Tetiana BIRIUKOVA[3],
Vitalii OSIPOV[4],
Maryna KRIUKOVA[5],
Liliya TOMICH[6]

[1] National Pedagogical Dragomanov University, Ukraine, valya-bilyk@ukr.net
[2] Izmail State University of Humanities, Ukraine, osiabasht@gmail.com
[3] Kherson State University, Ukraine, wwwisdom777@gmail.com
[4] Berdyansk State Pedagogical University, Ukraine, shef_fizvosp@ukr.net
[5] National University "Odesa law Academy", Ukraine, marisel039@ukr.net
[6] Kyiv National University of Technology and Design (KNUTD), Ukraine, liliya_tomich@ukr.net

Abstract: *The article considers the issue of the principles of realization of physical therapy of students from the point of view of neurosciences. The article notes that modern higher education is characterized by the appearance of a new medical specialty "Physical therapy, Ergotherapy". The emphasis is made on the fact that the Ukrainian society badly needed such specialists. The essence of such concepts: "higher education", "specialist", "vocational training", "physical therapy", "Ergotherapy", "rehabilitation therapist", "neuropedagogy", "neuropsychology" is considered. It is noted that physiotherapists from Japan played an important role in assisting athletes during the 2020 Olympic Games. Since 2007, the Ukrainian Association for Physical Therapy has been organized in Ukraine. It is proved that the first appearance of the profession, which is associated with physiotherapy exercises, dates back to the beginning of the XX century. It is noted that the government document gives the right to be in training persons who have special educational problems. A review of articles by domestic and foreign authors on the use of physical therapy to improve human health is made. The main aspects of training a future specialist in physical therapy are disclosed. It is noted that university teachers should think about a modern approach when teaching subjects. The professional training of future specialists in physical therapy to work on improving the health of athletes has been studied in detail. Structural components that should be taken into account by future specialists are noted. The interactive methods and forms of work that are integral to teaching students are named. It is noted that future specialists should have not only knowledge of physical culture, but also pedagogical, psychological and physiological methods of work. In addition, it was noted that for rehabilitation therapists it is important knowledge of intersubject relationships. The active-operational component of the professional activity of students has been investigated. In addition, it is noted that the physiotherapist should be professional in the selection of exercises for remedial gymnastic. Since it was found that the neuropsychological overload of students requires physical therapy.*

Keywords: *Higher education, specialist, vocational training, physical therapy, Ergotherapy, rehabilitation therapist, neuropedagogy, neuropsychology.*

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Introduction

The intensive development of higher education is manifested in the appearance of new specialties for modern students. Therefore, one of the branches is the specialty "Physical therapy, Ergotherapy". This is a modern profession that combines unique knowledge, skills in the use of physical exercises to support, develop, recover a person's physical activity during aging, injuries, pains, diseases, etc. Changes and reforms in health care in Ukraine emphasize the need for such specialists who would be professionals and competitive specialists in the labor market.

A fast pace of life, a decrease in stress resistance, the lifestyle of many people is based on a decrease in physical activity and an increase in the consumption of foods rich in cholesterol - all these factors are the causes of the risk and occurrence of various diseases. This can be helped by a healthy lifestyle, preventive anti-stress steps, care for the cleanliness of the environment, various rehabilitation techniques, Dyachenko T.V. (2007).

Therefore, to begin with, it is necessary to find out such concepts as higher education, specialist, vocational training, physical therapy, Ergotherapy, rehabilitation therapist, neuropedagogy, neuropsychology.

The definition of "higher education" is in the Article 1 of the Law of Ukraine "On Higher Education", therefore it is "a complex of systematized knowledge, skills and practical skills, ways of thinking, professional, ideological and civic qualities, moral and ethical values, and other competencies obtained in institution of higher education, which correspond to the field of knowledge for a certain qualification at the levels of higher education ", P. Poroshenko (2014).

In the Dictionary of the Ukrainian language, edited by I.K. Bilodid (1979, p. 570) explanations of the word "specialist" are presented 1) "the one who perfectly owns the specialty, has high qualifications, deep knowledge in a certain field of science, technology, art", 2) "the one who has done some business by his personal profession ".

It becomes known from the Article 1 of the Law of Ukraine "On Higher Education" that "vocational training is a student obtaining qualifications in the correspond field of study or specialty", Poroshenko P. (2014).

In a note by Bernstein S. (2021), the following definition is given: "physical therapy is a help to a person that relieves pain, improves physical activity and development of abilities, helps to recover from a sports injury,

surgery, rehabilitation after illness, teaches to use assistive devices or prosthetic limbs".

The article by Bagriy I. (2014) gives an interpretation of the concept of "Ergotherapy" - this is an area of professional activity that focuses on the role of human employment in the development process.

An article by Gardner M. (2014) defines that "a rehabilitation therapist is a health care professional who helps patients recover from physical trauma or mental illness and back to their normal life".

According to Voznyuk A. V. (2019), "neuropedagogy is a neuroscience that combines knowledge of cognitive neurology, differential psychophysiology, neuropsychology".

In the article by A.G. Shevtsov (2015), the meaning of the word "neuropsychology" means "the science of the brain, which combines correctional pedagogy and psychological and pedagogical rehabilitation, i.e. it studies the regularity of the psychomotor, cognitive and emotional state of a person".

Interestingly, that the World Confederation for Physical Therapy claims that physical therapists played a significant role in the Tokyo 2020 Olympics, Grant M. (2021). The Olympic Physical Therapy Group consisted of 800 specialists from the Japan Physical Therapy Association who made physical therapy, sports massage, ice baths, etc. for athletes.

According to the interpretation of the World Confederation for Physical Therapy (2019), physiotherapy is a service that physiotherapists offer to patients in order to recover maximum physical activity of a person. The reason for the need for physical therapy can be aging, trauma, pain, disease, disorders. Physiotherapists discover the cause of a disease, as well as plan and carry out rehabilitation of the patient, taking into account the physical, mental, emotional and social state of the patient. The task of physiotherapists is to carry out the examination of the patient in a qualified and professional manner, to assess the examination, find out the diagnosis, plan further actions, render with systematic consultations, conduct therapeutic exercises with the patient, cooperate with medical professionals. Without a doubt, practical activity will depend on the goal: whether it is focused on prevention or treatment, or rehabilitation of the patient.

By the way, since 2007, the Ukrainian Association of Physical Therapy has been organized in Ukraine thanks to the efforts of the Lviv Association of Physical Rehabilitation Specialists.

Review of the literature on the realization of physical therapy to improve human health

At the beginning of the 20th century in the United States, they first started talking about the appearance of a profession that is associated with remedial gymnastic. Patients during the polio epidemic, as well as those injured during the First World War, required emergency assistance: specialists who would understand physical exercises.

Article 3 of the Law of Ukraine "On Amendments to Certain Laws of Ukraine Concerning Access of Persons with Special Educational Needs to Educational Services" states that at present, inclusive vocational (vocational) training is organized for persons with disabilities, i.e. educational services are provided for obtaining a profession, Poroshenko P. (2018). Therefore, physiotherapy is useful not only for persons with special educational needs, but also for healthy students, because the use of physical exercise, physical fitness and the prevention of injuries and obesity contributes to the overall strengthening of human health. Knowledge of neurosciences is used by psychologists and teachers both in institutions of general secondary education and in higher education. It is known that physical exercise is one of the tools that is the key to successful learning. Undoubtedly, remedial gymnastic is unique for the development of motor skills.

A clinical guide written by Louw A. (2018) provides patient advice on pain management and neuroscience knowledge to help develop the body, move better, promote exercise, and restore hope for a healthy mind. Scientists explain how the human body and brain work, why pain appears, how you can overcome the symptoms of the disease with the help of neuroscience knowledge and improve your health. Knowledge of this guide will be useful for students studying physical therapy and doctors who work in this direction and patients to successfully treat chronic pain.

The guide by Mitra R. (2019) "Principles of Rehabilitation Medicine" deserves special attention, where the author proposes the treatment of cerebral hemorrhage, spinal cord injuries and traumatic brain injuries based on neurosciences. The author draws attention to the rehabilitation of patients who have amputated limbs or patients suffering from cardiovascular or pulmonary diseases. The author considers child rehabilitation, prosthetics and orthopedics separately from adult rehabilitation.

Minnis G. (2017) in his work lists diseases that a physiotherapist can treat: cardiopulmonary, carpal tunnel syndrome, musculoskeletal disorders,

neurological and pediatric, sports injuries, pelvic floor dysfunctions. Among the methods of treatment, the teacher can use orthopedic, geriatric, neurological physical exercises, cardiovascular and pulmonary rehabilitation, children's physical therapy, wound care therapy, vestibular and decongestive therapy, pelvic floor rehabilitation.

Noteworthy is the comprehensive reference book by Palisano R. (2016), which details children neuropsychological disorders. Emphasis is placed on the benefits of remedial gymnastic, which develops fine motor skills, improving not only the physical condition of the child, but also the work of the brain. The authors offer recommendations on the correct use of tests in the practice of a physiotherapist. Special attention is paid to the treatment of children asthma.

The Middleton K. (2020) manual was prepared by two physiotherapists who developed pediatric exercises for use with children to develop their hand motor skills. This mannual helps to understand the importance of physical activity for the learning and progress in studies of children.

The main aspects of training a future physical therapy specialist

A modern approach to the organization of the educational process in a higher educational institution requires the training of a competitive specialist. Classes should help to attract students to intense activities, carry motivation to study the material, and also contain planned educational and cognitive activities that are aimed at solving certain educational problems. Currently, neurorehabilitation is one of the main areas of modern medicine. Restorative medicine is based on three factors: traditional physical rehabilitation, new technologies and achievements in complex rehabilitation, A.A. Kozyolkin. (2020).

The issue of the peculiarities of training future specialists in physical therapy and occupational therapy (ergotherapy) in universities was covered by the domestic researcher Bazylchuk O (2018). The author examines in detail the professional training of future specialists in physical therapy to work to recover the health of athletes. He focuses on the fact that future specialists in physical therapy should have the knowledge, skills, abilities, personal qualities that contribute to the support of successful activities to recover athletes' working capacity. The researcher characterizes the structural components of the readiness of future specialists: motivational, scientific and theoretical, procedural, personal, which are necessary for the

implementation of rehabilitation measures to recover the health of athletes. As it turned out, the health level of athletes is highly dependent on the conditions for organizing training, as well as taking into account the sanitary and hygienic conditions. Among the reasons for sustain sports injuries are: a weak level of training sessions, individual characteristics of athletes are not taken into account, non-compliance with safety standards, neglect of sanitary and hygienic standards, systematic use of excessive exersices, underestimation of systematic work on technique, fatigue, wrong warm-up, wrong use of standing by (in a case of accident). It is noted that the formation of professional development of specialists in physical rehabilitation is influenced by objective and subjective factors. In addition, the study developed a complex of interrelated concepts and target, theoretical and methodological, substantive, procedural and criterion-diagnostic blocks. The author examines in detail the pedagogical conditions created in higher education, in particular, he notes the use of interactive teaching methods and believes that they are an integral part of ensuring the development of the professional activity of future rehabilitation therapists. Among the forms of work, teachers are recommended to use a "round table" to develop a discussion between students, a method of situational exercises, "brainstorming", business games, a method of projects, to develop a portfolio. To invite medical workers, experienced specialists and athletes to classes. The researcher in his manual notes that the discussion helps students to dive deeply into the problem, discuss it and come to the right conclusions. Students can simulate the process of activity using a business game and work in a team. Among business games, it is recommended: simulation, operational, role-playing, traditional project, etc. The basic element of a business game is the development of a game scenario, in which a phased algorithm is presented. It is noted that the business game helps the student to consciously understand the essence of his profession. The case method attracts students to independence, assessment of real problems, the ability to analyze and find the main and the secondary. Such individual and group work helps students to develop their competencies. "Brainstorming" has its own structure: an introductory stage, generating thoughts and a conclusion. This form of work contributes to the fact that each student is actively involved in the work, because everyone has to speak out. Among the advantages of this method are: equality of students with respect to proposals, the creation of a cognitive process, a decrease in closed thinking, students overcome internal and mental obstacles. The project method helps

students develop critical thinking, self-process material, and make presentations. The portfolio is one of the criteria for self-assessment of a future specialist, because he has to give reflection on his activities. Without a doubt, the above-mentioned interactive forms of work help to the development of personal qualities: independence, determination, the ability to formulate thoughts and work in a team.

Noteworthy is the article by A.V. Chesnokov. (2007), in which the author raises the question of the professional training of future specialists in physical culture and notes that students should have not only good achievements in physical culture, but also master pedagogical, psychological and physiological methods. The author notes that 2 experiments were carried out for two groups of students - gymnasts, after which new methods were proposed to improve their professional training. At the same time, the author believes that it is necessary to take into account the individual state of health, sports specialization and training.

Zyuzin V.A. (2009) argues that interdisciplinary relations necessary for professional activity play an important role for the professional training of future physical rehabilitation therapists. The author notes that scientific studies prove the significant effectiveness of rehabilitation methods. If a rehabilitation therapist draws up a rehabilitation program competently, then more than 50% of patients can back to an active, mobile, normal lifestyle.

Kopochynska Yu. (2020) investigated the formation of the activity-operational component of the professional identity of future specialists in physical therapy and occupational therapy. The author examines the active-operational component of the professional activity of students, which is implemented through the appropriate methods, forms and techniques of rehabilitation. The active-operational component is manifested according to a certain algorithm: 1) observation, active listening, according to the actions, words, gestures of a person; 2) understanding and interpreting others, 3) conclusions and evaluating actions. *The principle of professional training* that support the improvement of physical activity and lifestyle of a person contains the knowledge of students in remedial gymnastic and occupational therapy. Future specialists should think about improving their qualifications and improving self-education after getting higher education. In the work of a physical therapist, *consistency* is a prerequisite, it consists in a combination of cognitive and practical activities of students. In addition, it is worth studying new information in order to form a system of associations with already acquired knowledge. In addition, systematic thinking supports to the

efficient functioning of the brain, because the brain is regularly faced with stress in certain portions. Knowledge of interdisciplinary relationships will contribute to the holistic study of a certain material. The training of a specialist in physical therapy and occupational therapy requires specific planning and carefully selected, developed program support. Consistency should be shown by the teacher in the organization of the educational process of each lesson and in the making of homework by students. The principle of *continuity* should show the duration of training, structure and phasing. Continuity should be a progressive movement for students in the study of new disciplines, in their mastery of new knowledge, in an active participation during practical classes. All this contributes to the formation of professional and necessary traits of a future specialist. The principle of the *unity of individualization and differentiation*, i.e. teachers must take into account the individual characteristics of each person while teaching subjects, because all personalities are unique: they have their own abilities, tendencies, inclinations, needs. In addition, the teacher should take a differentiated approach to testing the knowledge acquired by students. The next principle is the *activity criterion*, which contains professional competence, i.e. the result of self-expression of a future specialist. The principle of *activity* shows the student's ability to apply and keep the moral norms of professional ethics: the ability to make an arrangement with the patient, achieve effective communication, use non-verbal signals. Thus, the basic level of the formation of the professional identity of future physical therapy specialists is the ability to keep moral norms for communicating with the patient. A high level is characterized not only by successful communication, but also by the ability to apply rehabilitation practice based on modern scientific discoveries, as well as to solve complex issues that appear in practice. The highest level differs from the previous one in that the specialist knows how to analyze situations well and even prevent and foresee them, avoid unnecessary.

Barker K. (2019) draws attention to the basic principles of remedial gymnastic and offers a complex of exercises. The author notes that the American health care system focuses on the use of physical exercises. The work presents a program of exercises, including aerobic exercises, which form flexibility, stability, and promote motor development - all this supports to the maintenance and improvement of physical health. In addition, the author claims that properly selected physical activity is an effective therapy. The physical therapist should select an individual exercise program when prescribing home exercises to help the person cure a medical condition and

maintain his health. Noteworthy is the Greeman technique, who believed that special attention should be paid to the length, strength and control of muscle function, DeStefano L. (2011). Therefore, a successful exercise program recovers not only muscle function, but also the nervous system. To do this, he developed the following algorithm: 1) training sensory motor balance, 2) stretching the short, hypertensive muscle to symmetry, 3) strengthening of inhibited muscles, 4) recovering of symmetrical movements, 5) aerobic coordination. An interesting method developed by McGill, which consists in passing a 5-stage algorithm: 1) identify and eliminate abnormal movements, 2) recover the work of joints throughout the body through physical exercises that are focused on the correct activity of the spine, 3) develop endurance, 4) and 5) train strength, agility, speed in athletes, McGill S. (2015).

A review of the literature of domestic and foreign researchers shows that physical therapists are developing a program of physiotherapy exercises, which includes fitness classes (improves the functioning of the cardiovascular system, strengthens muscles), swimming (breathing, movement, flexibility, muscle tone training, strength in water) , conducting games for children, physical education for adults (improving coordination of movements, psychological and coordination abilities).

Physical rehabilitation includes remedial gymnastic, therapeutic massage, physiotherapy, and ergotherapy. Remedial gymnastic is a complex of physical exercises aimed at muscle activity. During physical exercise, the patient doing movements consciously, during which sometimes it is necessary to overcome pain, discomfort that arose due to injuries or burns. Physical exercises in remedial gymnastic are classified into gymnastic (for the muscles of the head, neck, arms, body; breathing, corrective; they can be done with or without objects), ideomotor (done only in the imagination, thus developing "muscle sensitivity", they are transition to more complex exercises), applied sports (walking, climbing, crawling, running, swimming.)

A study on therapeutic education and health promotion in persons with neuropsychological overload syndrome is covered by a group of scientists led by Georgescu L. (2017). Researchers have found that even monotonous activity, lack of interest in work can lead to attention failure and memory, the appearance of fatigue. Therefore, for teaching physical therapy students, teachers daily try to combine practical and theoretical activities rationally, alternate active forms of learning with less active ones. In addition, a balanced diet and healthy sleep are necessary, the physical and

mental state of the student depends on these factors. Common symptoms: fatigue, decreased attention, anxiety, irritability, emotional instability, behavioral disorders, drowsiness, poor memory, lack of interest in learning - indicate the syndrome of neuropsychological overload of students. Constant chronic fatigue reduces the body's ability to work actively, and therefore it becomes necessary to be at rest in order to regain its strength. The exhausted body needs to be recovered. The authors investigated the neuropsychological overload of students and determined that unsystematic, malnutrition, insomnia, and lack of exercise led to the appearance of chronic diseases in students. Overload syndrome - a condition characterized by physical, cognitive, and emotional impairments that result in poor mood, frustration, depression, memory impairment, poor academic performance, and loss of self-esteem. To overcome such disorders, neuropsychological and physical mechanisms should be activated. For the experiment, the correspondents recruited 50 students, who were divided into two groups: one - students who just study, and the other - study and work. According to the results of the study, it was found that most of the students of the second group experienced chronic fatigue syndrome. Experiment has shown that overload affects activity and quality of life.

Conclusions

The article considers the issue of the principles of realization of physical therapy of students from the point of view of neurosciences. It was noted that modern higher education is characterized by the appearance of a new medical specialty "Physical therapy, Ergotherapy".

The essence of the concepts was considered: "higher education", "specialist", "professional training", "physical therapy", "Ergotherapy", " rehabilitation therapist", "neuropedagogy", "neuropsychology". It was noted that physiotherapists from Japan played an important role, who provided assistance to athletes during the Olympic Games - 2020. By the way, it is noted that since 2007 the Ukrainian Association of Physical Therapy has been organized in Ukraine.

It has been proven that at the beginning of the 20th century, the first appearance of a profession associated with remedial gymnastic was recorded. The Law of Ukraine stipulates the right to get education for persons with special educational problems.

A review of articles by domestic and foreign authors on the use of physical therapy to improve human health is made. The main aspects of

training a future specialist in physical therapy are considered. In addition, it was noted that university teachers should think about a modern approach when teaching subjects. The professional training of future specialists in physical therapy to work on improving the health of athletes has been studied in detail. Structural components were highlighted that should be taken into account by future professionals. The interactive methods and forms of work that are integral to teaching students are named. It is noted that future specialists should not only possess knowledge of physical culture, but also master pedagogical, psychological and physiological methods.

In addition, it was noted that knowledge of interdisciplinary relations is important for rehabilitation therapists. The active-operational component of the professional activity of students has been investigated. The physical therapist should be professional in the selection of exercises for remedial gymnastic.

It is found out that common symptoms such as: fatigue, decreased attention, anxiety, irritability, emotional instability, behavioral disorders, drowsiness, poor memory, lack of interest in learning - indicate the syndrome of neuropsychological overload of students.

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