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Інна ЧЕРЕДНИЧЕНКО
Національний університет «Запорізька політехніка», Україна
https://orcid.org/0000-0003-0373-5574
missis.tcheredni4enko2011@gmail.com
Наталія ЧУХЛАНЦЕВА
Національний університет «Запорізька політехніка», Україна
https://orcid.org/0000-0001-8403-263X
chuhnv@zp.edu.ua
Сергій ЛУЦЕНКО
Національний університет «Запорізька політехніка», Україна
https://orcid.org/0000-0003-3787-1574
2lutsenko2@gmail.com

ВОЛЕЙБОЛ ЯК ЗАСОБІ ПРОФЕСІЙНО-ПРИКЛАДНОЇ ФІЗИЧНОЇ ПІДГОТОВКИ В ЗАКЛАДАХ ВИЩОЇ ОСВІТИ СТУДЕНТІВ СПЕЦІАЛЬНОСТІ 141 ЕЛЕКТРОЕНЕРГЕТИКА, ЕЛЕКТРОТЕХНІКА ТА ЕЛЕКТРОМЕХАНІКА

Анотація. *У закладах вищої освіти передбачена підготовка кваліфікованих та конкурентоспроможних фахівців, які не лише володіють певним рівнем знань, умінь і навичок, але й можуть практично використовувати їх для досягнення поставленої мети, пов'язаною з їх майбутньою професією. Відповідно Стандарту вищої освіти України для здобуття ступеня бакалавра передбачено 240 кредитів ЄКТСУ, з яких не менш ніж 25% повинні складати дисципліни вибіркового компоненту, які спрямовані на забезпечення загальних та спеціальних компетентностей за спеціальністю. Одна з загальних компетентностей спеціальності 141 Електроенергетика, електротехніка та електромеханіка – використання різних видів та форм рухової активності для активного відпочинку та ведення здорового способу життя, для реалізації якої студентам старших курсів була запропонована вибіркова дисципліна «Професіно-прикладна фізична підготовка (засобами волейболу)». У статті теоретично обгрунтована та представлена програма для студентів освітнього рівня бакалавр, спрямована на розвиток професійно-прикладних фізичних якостей та психофізичних функцій, від рівня розвитку яких залежить якість виконання обов'язків майбутнього фахівця. Розроблена програма передбачає певний рівень володіння студентами технічними навчичками волейболу, що було підставою можливості вибору дисципліни. Зміст програми враховує специфіку професійної діяльності, яка характеризується великим навантаженням зорового, слухового, м'язово-рухового і тактильного аналізаторів. Дисципліна «Професійно-прикладна фізична підготовка» розрахована на 180 годин, з яких: 14 годин лекційних, 60 годин - практичних, 96 годин – самостійна робота і 10 годин – індивідуальні завдання та складається з п'яти змістовних модулів. Основними критеріями оцінювання якості засвоєння дисципліни «Професійно-прикладна фізична підготовка (засобами волейболу)» була рекомендована динаміка показників розвитку фізичних якостей і здібностей відповідно фаху.*

Ключові слова: *вища освіта; професійний розвиток; психофізичні функції; технічна майстерність; студент-спортсмен.*

Inna CHEREDNYCHENKO
National University «Zaporizhzhia Polytechnic», Ukraine
https://orcid.org/0000-0003-0373-5574
missis.tcheredni4enko2011@gmail.com
Natalia CHUKHLANTSEVA
National University «Zaporizhzhia Polytechnic», Ukraine
https://orcid.org/0000-0001-8403-263X
chuhnv@zp.edu.ua
Serhii LUTSENKO
National University «Zaporizhzhia Polytechnic», Ukraine
https://orcid.org/0000-0003-3787-1574
2lutsenko2@gmail.com

VOLLEYBALL AS A MEANS OF PROFESSIONALLY APPLIED PHYSICAL TRAINING IN HIGHER EDUCATION INSTITUTIONS FOR STUDENTS SPECIALIZING IN 141 ELECTRIC POWER, ELECTRICAL ENGINEERING, AND ELECTROMECHANICS

Abstract. *Higher education institutions train qualified and competitive specialists who not only possess a certain level of knowledge, skills, and abilities but can also apply them practically to achieve their professional goals. According to the Standard of Higher Education of Ukraine, a bachelor's degree requires 240 ECTS credits, of which at least 25% must be elective courses aimed at developing general and specific*

competencies in the speciality. One of the general competencies for the speciality 141 "Electric Power, Electrical Engineering, And Electromechanics" is the ability to use various types and forms of physical activity for active recreation and a healthy lifestyle. To support this competency, the elective course "Professional and Applied Physical Training (using volleyball)" was offered to senior students. The article theoretically substantiates and presents a program for bachelor's degree students aimed at developing professionally applied physical qualities and psychophysical functions, the levels of which determine the quality of a future specialist's duties. The developed program assumes students possess a foundational mastery of basic volleyball techniques, which served as a prerequisite for enrolling in the course. The content of the program takes into account the specifics of professional activity, which is characterized by a heavy load on visual, auditory, musculoskeletal, and tactile analyzers. The discipline 'Professional and Applied Physical Training (using volleyball)' is designed for 180 hours, including 14 hours of lectures, 60 hours of practical classes, 96 hours of independent work, and 10 hours of individual assignments and consists of five content modules. The main criteria for assessing the quality of mastering the discipline 'Professional and Applied Physical Training (using volleyball)' were recommended to be the dynamics of indicators of the development of physical qualities and abilities by the speciality.

***Keywords**: higher education; occupational exposure; professional development; psychophysical functions; technical skills; student athlete.*

Statement of the problem. The modern energy complex is one of Ukraine's priority development areas. It's a complex system comprising 4 nuclear power plants and 44 thermal power plants, housing 104 power units ranging from 150 to 800 MW in capacity. Over 300,000 specialists are employed within Ukraine's energy sector [14].

Surveys of energy sector specialists have shown that their work demands optimal health and high functionality of all bodily systems, including adaptive mechanisms and thermoregulation. Additionally, a broad range of qualities is essential: general endurance, movement speed, coordination, various reaction types, attention span, operational thinking, emotional stability, an optimal physiological response to cognitive tasks and stressors, courage, determination, and resistance to ionizing radiation [10]. Skills in efficient walking, working at heights, and movement with limited support are also required.

Physical education and sports are among the most effective components in training highly qualified specialists [15, 20]. The high physical fitness of energy sector specialists can be effectively developed through professionally applied physical training (PAPT). A review of the literature reveals that issues related to PAPT are insufficiently substantiated, making it relevant to develop a training program within higher military educational institutions that prepare power engineers. One effective tool for PAPT is sports games, particularly volleyball.

Analysis of recent research and publications. Physical education in higher education institutions (HEIs) is not only an essential element for the comprehensive development of students, promoting health maintenance and enhancement, and physical and spiritual improvement, but also serves as high-quality preparation for their future professional activities [3, 5, 9, 17].

Professional and applied physical training in HEIs is a key component in preparing students for future careers. It promotes the development of professionally significant physical qualities, associated abilities, and psychophysical functions [4]; the acquisition of motor skills, abilities, and sport-specific proficiencies relevant to professional applications; maintenance and restoration, as needed, of professional performance; prevention and correction to counter adverse workplace factors; and the formation of motivation, interest, and habit for regular physical activity [3, 9, 16]. This training is aimed at adapting and preparing individuals not for work in general but for a specific type of work. Consequently, its objectives are specialized, and determined by the specific demands of a profession [2]. All of this underscores the distinctive nature of professional and applied physical training (PAPT) and the potential for integrating the full range of physical education tools.

Professional-applied physical training, as an essential component of students' preparation for professional activities, has been extensively studied by both domestic and international researchers [1, 3, 13, 17, 20]. Significant attention has been devoted to developing effective methods and programs for physical education that focus on cultivating physical qualities essential for future professions [5, 6, 18, 19]. The incorporation of sports games into the educational process has been highlighted as a promising approach to enhance students' motivation for physical education and improve their overall physical fitness [1, 15].

Efremova A.Ya. [5] studied the specific features of professional activity and the factor structure of professionally applied physical fitness for future electrical engineers in railway transport, based on which she substantiated and developed a PAPT program for higher education. The practical training program proposed by Raevsky R.T. and Khalaydzhi S.V. [10, 14] included classes in athletics, swimming, sports games, applied gymnastics, and special exercises, all aimed at the targeted development of psychophysiological and psychophysical qualities and skills necessary for the successful performance of those working in the energy sector.

An analysis of sources shows that the topic of professionally applied physical training through volleyball for electrical engineering students is insufficiently addressed in the literature. The features of specialized training considering the professional requirements of electrical engineers are not explored, and the organizational and methodological foundations for structuring PAPT technology in alignment with the structure and function of HEIs have not been developed. Such training for electrical engineers is generally lacking both during their studies and in subsequent professional practice. The primary reason is the absence of a scientifically substantiated, systematic understanding of PAPT for future specialists in electrical fields,

along with a practical implementation plan for this training within specialized educational institutions, industrial enterprises, and companies.

Highlighting unresolved aspects of the general problem. The analysis of the literature revealed that PPAP in HEIs is not studied as a separate discipline; instead, it is considered a component of the discipline of physical education. The available literature does not identify any programs in the discipline of "Professional and Applied Physical Training" for bachelor's students in the field of knowledge 14 (Electrical Engineering), and speciality 141 (Electric Power, Electrical Engineering, and Electromechanics).

Furthermore, the relevance of developing the curriculum stems from the need to enhance the methods of physical education for students, aligning with the requirements for performing professional motor actions, particularly through specialized game exercises based on volleyball. Structuring the program, enriching it with modern educational tools, and providing recommendations for ongoing monitoring and certification can support an in-depth study of volleyball, improve game skills, and help students master a wide range of technical and tactical abilities. This, in turn, will contribute to the development of professionally applied physical qualities and psychophysical functions essential for the effective performance of professional duties.

The research goal. To theoretically substantiate and develop a curriculum for the selective component "Professional and Applied Physical Training" for students at the bachelor's level in the field of knowledge 14 Electrical Engineering, speciality 141 Electric Power, Electrical Engineering, and Electromechanics utilizing volleyball to foster professional and applied physical qualities and psychophysical functions.

Methods. The research methods employed include theoretical analysis and generalization of data from scientific, methodological, and specialized literature, as well as Internet resources. Additionally, there is an analysis of documentary materials, such as the Standard of Higher Education of Ukraine in the field of knowledge 14 Electrical Engineering, speciality 141 Electric Power, Electrical Engineering, and Electromechanics, bachelor's degree [12]; and programs for the academic disciplines "Health-Saving Technologies and Promotion of Functional Development (Volleyball)" [7] and "Innovative Technologies for the Development of Physical Qualities and Sports Improvement (Volleyball) [8].)

Findings. The curriculum we developed for the discipline "Professional and Applied Physical Training" for bachelor's degree students in the field of knowledge 14, Electrical Engineering, speciality 141, Electric Power, Electrical Engineering, and Electromechanics, using volleyball, can be offered as an elective component for senior students. This elective is intended for students who have already covered volleyball content in the junior courses as part of the "Physical Education" discipline.

The opportunity to study "Professional and Applied Physical Training" is available to students who not only select it as part of the elective component but also possess a certain level of technical volleyball skills, as assessed by the following tests [11]:

– an overhead pass with two hands, forward and upward, targeting a basketball backboard or wall, counted by the number of successful passes before an error;

– an overhead pass with two hands into a circle with a diameter of 3 m, counted by the number of successful passes before an error;

– an underhand pass from a partner's throw (distance of 9 m between partners) to zones measuring 3 x 3 m (3 attempts per zone), counted by the number of accurate passes;

– a direct attacking hit, performed from a self-throw or a partner's pass, over a competition-height net from zones 4 and 2, executed on the move and with a transfer (5 attempts for boys, 4 for girls);

– an overhand serve, counted by the number of accurate attempts out of 10;

– an underhand serve from 4 attempts, counted by the number of accurate serves into zones 1, 5, and 6 for fellows and any zone for girls.

The sufficient level of mastery of in-game skills and abilities demonstrated by students enables them to perform specialized exercises in this sport more efficiently and to apply their existing skills and abilities toward the effective development of professionally relevant physical qualities and psychophysical functions, which impact the quality of their future work activities. Additionally, this proficiency allows the teacher to accurately and promptly select appropriate methods and resources to optimize the learning process and achieve the intended educational goals when planning volleyball lessons.

Regardless of field of knowledge or specialty, at least 50% of the content of the educational program should be dedicated to ensuring the formation of both general and specialized (professional) competencies within the specialty, as defined by the Higher Education Standard.

One of the general competencies specified in Ukraine's Higher Education Standard for the bachelor's level in specialty 141 is the ability to preserve and enhance society's moral, cultural, and scientific values and achievements. This is achieved through an understanding of the history and development patterns of the subject area, its role in the broader system of knowledge about nature and society, and the development of society, engineering, and technology. Additionally, it includes the ability to engage in various types and forms of motor activity for active recreation and a healthy lifestyle (K10) [12].

Acquiring this general competency during higher education supports the integration and application of specialized (professional, subject-specific) competencies among students. It is a primary component of preparing future electrical engineers for the workforce, positively influencing the development of essential physical and mental qualities and motor skills relevant to the profession [9, 10].

Considering the implementation of one of the general competencies: to use various types and forms of motor activity for active recreation and a healthy lifestyle for students of specialty 141, the purpose of teaching the academic discipline "Professional and Applied Physical Training" using volleyball is to form knowledge and practical skills in future electrical engineers regarding the organization of PAPT aimed at maintaining and improving health [18], developing applied physical qualities and psychophysical functions that will impact the effectiveness of their future professional work. The tasks for studying this discipline are:

1. Strengthen and restore health while maintaining high levels of physical fitness and fostering a healthy lifestyle throughout the study period.

2. To develop students' understanding of the role of professional and applied physical training in personal and professional development, with a focus on improving physical qualities, psychophysical functions, and self-improvement through volleyball.

3. Equip students with essential applied knowledge, skills, and abilities in planning, monitoring, and managing PAPT using volleyball as a practical tool.

The program content takes into account the specifics of professional activity, characterized by a high load on the visual, auditory, muscular-motor and tactile analyzers.

In the process of studying the course, the emphasis was placed on the acquisition of knowledge on the following issues: the place of PAPT in the content of preparation for a future profession, means and methods of education and development of physical qualities and psychophysical functions in accordance with the specifics of the profession, methodological foundations of organizing and managing the process of professionally applied physical training. The program is student-centered and provides an active, interactive approach, offering higher education learners the opportunity to reflect on their cognitive, affective, and psychomotor areas of learning, deepening their knowledge of physical activity and motivating them to make a long-term commitment to a healthy lifestyle.

When developing the training program, the mental processes and perceptual-motor abilities involved in information processing by electrical engineers were taken into account [10, 14]: muscular-motor sensations; perception of space, time, movement; observation: visual, auditory; representations: visual, auditory, tactile, motor; operational and long-term memory and thinking; distribution, volume, switching, concentration, stability of attention; mental operations (analysis, synthesis, comparison, specification).

Necessary physical qualities and abilities that subsequently impact the quality of professional performance include [10]: motor coordination (the ability to move efficiently, accurately, quickly, and dexterously), including general and sensorimotor coordination, a sense of balance, the ability to synchronize arm and leg movements, and the skill to accurately manipulate objects with the hands, particularly with the fingers; strength, specifically the ability to sense and apply small force loads precisely; general and static endurance of trunk muscles; speed and control of movement (general, simple motor reactions, and reactions to a moving object); reaction time (discrimination, switching, selection) and the integration of cognitive functions such as memory, decision-making, and rapid response in crisis situations; ability to quickly learn new hand movements and control body movements by accurately interpreting sensory information (visual, auditory, and tactile); hand joint mobility.

Upon completing the course "Professional and Applied Physical Training" using volleyball, students should be able to analyze scientific and methodological literature; creatively apply acquired knowledge to solve situational problems; possess a solid foundation in the scientific and methodological principles of PAPT; select appropriate volleyball-based exercises to develop essential psychophysical functions and physical qualities; design individualized health programs to improve professional performance; and apply their knowledge and skills in future professional activities.

The scope of the discipline "Professional and Applied Physical Training" for bachelor's degree students in the 141 Electric Power, Electrical Engineering, and Electromechanics specialty is 6 ECTS credits, totaling 180 hours. This includes 74 hours of contact work with the teacher (14 hours of lectures, 60 hours of practical work), 96 hours of individual study time, and 10 hours for individual assignments.

The program of the academic discipline consists of the following content modules:

1. Professional and applied physical training for future specialists in specialty 141 Electric Power, Electrical Engineering, and Electromechanics.

2. Methodological aspects of professionally applied physical training.

3. Reiteration and consolidation of volleyball techniques.

4. Evolvement of physical qualities through general physical training in volleyball.

5. Evolvement of physical qualities through specialized physical training in volleyball.

Content Module 1: Professional and applied physical training for future specialists in specialty 141 Electric Power, Electrical Engineering, and Electromechanics includes the following topics:

– modern concepts of professionally applied physical training;

– professional and applied training for students in specialty 141 Electric Power, Electrical Engineering, and Electromechanics.

Content Module 2: Methodological aspects of professionally applied physical training includes the following topics:

– means and methods of professionally applied physical training;

– forms of organizing classes in papt;

– planning, monitoring, and managing the process of professionally applied physical training.

Content Module 3: Review and consolidation of volleyball playing techniques includes:

– reiteration of stances and movement techniques;

– technique of passing with two hands overhead;

– technique of passing with two hands underhand;

– passing the ball in various conditions;

– technique of underhand serve;

– technique of overhead serve;

– jump serve technique;

– attack hitting techniques;

– blocking techniques;

– skill assessment in ball handling techniques.

Content Module 4: Development of physical qualities through general physical training in volleyball includes the following topics:

– introductory testing in general physical training;

– agility development;

– speed development;

– endurance development;

– flexibility development;

– strength development.

Content Module 5: Development of physical qualities through specialized physical training in volleyball includes the following topics:

– evolvement of general and static endurance of trunk muscles, concentration, and attention span;

– evolvement of movement speed;

– evolvement of strength and the ability to sense and dose small force loads accurately;

– evolvement of reactions to a moving object;

– evolvement of coordination for arm, hand, and leg movements;

– testing of specialized physical fitness.

Expected learning outcomes of the discipline Professional-Applied Physical Training through volleyball:

– demonstrate awareness of and adherence to professional, social, and emotional behavior, maintain a healthy lifestyle, and integrate this awareness into personal practice;

– understand the fundamental psychophysical functions and physical qualities that influence labor efficiency in the electrical engineering profession;

– select volleyball techniques aimed at developing physical qualities and psychophysical functions according to the specific needs of the profession and apply this knowledge to routine and non-routine tasks;

– explain the principles behind creating and implementing individualized health improvement programs focused on developing professionally relevant physical qualities and psychophysical functions;

– monitor physical condition during volleyball exercises, adapt and apply expertise to meet unique objectives, and make adjustments to individual health improvement programs as needed.

The effectiveness of program assimilation in the discipline “Professional Applied Physical Training” through volleyball for bachelor's students in the field of 14 Electrical Engineering, specialty 141 Electrical Power Engineering, Electrical Engineering, and Electromechanics, will be evaluated based on test results to assess the level of professionally important physical qualities acquired during the course.

Conclusions. As a result of analyzing scientific sources, it has been found that PAPT is an important component of the preparation of bachelor's degree students and should consider the specific requirements of their future profession, as the quality of this preparation influences health preservation and work efficiency. The discipline "Professional and Applied Physical Training" with a focus on volleyball is designed to support the comprehensive development of future electrical engineers. The course aims to provide students not only with a thorough theoretical understanding of physical culture and sports but also with practical skills essential

for maintaining high levels of physical fitness and health. The training encompasses learning the fundamentals of volleyball, developing strength, endurance, coordination, and flexibility, as well as cultivating critical psychophysical qualities such as stress resilience, concentration, and decision-making ability. Special emphasis is placed on developing skills for independent planning and monitoring of physical activity, enabling students to manage their health effectively and enhance their future work performance.

Including the discipline "Professional and Applied Physical Training" in the curriculum for bachelor's degree students in the field of knowledge 14 - Electrical Engineering, specialty 141 - Electric Power, Electrical Engineering, and Electromechanics, will help prepare electrical engineers for their professional duties. The acquired skills will enable future specialists to be more resilient and energetic throughout the workday, allowing them to perform physically demanding tasks without fatigue, which in turn contributes to greater productivity and efficiency at work. They will be able to maintain good health and reduce the likelihood of injuries or illnesses related to physical exertion, thereby enhancing overall productivity. These skills will also help in relieving stress and increasing energy and concentration levels, enabling better focus on tasks. Additionally, specialists will enhance their creative thinking and decision-making abilities. By feeling better and experiencing greater life satisfaction, they will develop a positive attitude, increased motivation, and higher job satisfaction.

The proposed program provides a solid foundation for professional and applied physical training within the physical education curriculum for engineering students, demonstrating its significant potential to contribute to promoting higher productivity, health, and overall well-being and career readiness of future professionals. By emphasizing the importance of physical fitness and mental health, the discipline empowers students to take active steps toward a healthier and more active life. This program can serve as a practical guideline for physical education teachers and coaches in developing effective fitness programs for professionals, particularly in occupational areas where physical fitness is essential for improving productivity and overall quality of life.

Prospects for further research could include longitudinal studies to assess the long-term impact of the volleyball course on graduates' physical and mental health, career progression. Additionally, a deeper examination of the psychological and physiological benefits of physical activity, particularly volleyball, for electrical engineering students could be conducted.

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