

REVIEW ARTICLE

PEDAGOGICAL CHARACTERISTIC OF PHYSICAL THERAPY SPECIALIST'S TO BE NATURAL-SCIENCE COMPETENCE AND STAGES OF ITS FORMATION

DOI: 10.36740/WLek202106142

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ABSTRACT

The aim: Of article reveals the essence of the matter of scientific substantiation of theoretical concepts of pedagogical characteristic of natural-science competence of physical therapy specialist to be and stages of its formation.

Materials and methods: To achieve an object of the research a complex of research methods was used, in particular, theoretical ones: analysis and synthesis of scientific and methodic literature, methodic and normative documents; synthesis and systematization of research data; synthesis of scientific theories, approaches and conceptions to define the conditions of education of physical therapy specialist to be; empirical methods: observation and questioning.

Conclusions: In process of the research were defined: step-by-step specific features of natural-science education process, functions, typical activity tasks and types of skills of physical therapy specialist to be which made it possible to define the criteria of the formation of natural-science competence and formulate their competence characteristics. The developed criteria and indicators made it possible to substantiate the development of phased substance of natural-science education of physical therapy specialist to be at higher educational institution.

KEY WORDS: physical therapist, methodical system of education of physical therapists, natural-science competence, pedagogical characteristic

Wiad Lek. 2021;74(6):1515-1520

INTRODUCTION

The present-day system of higher education of Ukraine transforms under the conditions of globalized society of the 21st century. The problem of organization of educational process is one of the most important problems today. The dominating idea of it is the focus on professional education of specialists who are competent, professionally mobile, competitive and able to work effectively. Nevertheless, in Ukrainian pedagogical science the problems of modernization of content and technologies of natural-science education of physical therapy specialist to be are still unexplored; an integrated system of biomedical education is undeveloped; the ways to meeting the social demand of connection of theoretical knowledge and practice of educational and training, methodical and self-educational activity of the specialists are unexplored. Didactic and methodic problems of disciplines of natural-science course are scantily explored in system researches concerning physical therapy specialists. Thus, the main tendencies of update of content and forms of education of physical therapy specialist to be under the conditions of development of national educational system and market economic relations resulted in the research which is dedicated to modernization of natural-science education of physical therapy specialist to be at higher educational institutions

on the basis of increasing of biomedical orientation and development of natural-science competence by means of structuring of content of biomedical disciplines and increasing of importance of natural-science component of practical work and internships.

THE AIM

The research is aimed at scientific substantiation of theoretical concepts of pedagogical characteristic of natural-science competence of physical therapy specialist to be and stages of its formation.

MATERIALS AND METHODS

To achieve an object a complex of research methods was used, in particular, theoretical ones: analysis and synthesis of scientific and methodic literature, methodic and normative documents (standards of education, educational and professional characteristics, programs of professional education of physical therapists) which made it possible to fix the contradictions, formulate the problems of education of physical therapy specialist to be and find the possible ways to their solution; synthesis and systematization of research data which allowed to form the theoretical

and methodological basis of the research; synthesis of scientific theories, approaches and conceptions to define the conditions of education of physical therapy specialist to be; empirical methods: observation and questioning.

REVIEW

Substantiation of the essence of natural-science competence of physical therapy specialist is considered to be begun with basic terms which cause the specific features and principles of natural-science education of physical therapy specialist to be.

A term “professional education” is interpreted by the researchers as a formation of combination of special knowledge and skills, work experience and norms of behavior which ensure an opportunity for successful work [1; 2]; process of acquisition of knowledge and skills [3]; skills acquisition in appropriate course or specialty [4]; a combination of knowledge, skills, qualities, professional experience and behavior which ensure the success of work in the chosen field [5]. The process of learning of the complex of data shows that professional education of physical therapy specialist to be is a polysemantic formation, one of the components of which is pedagogical system of natural-science education. This system is composed of the unity of subsystems which are connected by hierarchy of inner correlations and relations with the environment.

At the same time, a term “professional education of physical therapy specialists to be” is considered to be a process which reflects scientifically and methodically valid measures of higher educational institutions which are directed to the formation of a level of professionally competent person able to organize rehabilitation activity for different social groups from a region and successfully work in all spheres in accordance with modern labor-market demands. Natural-science education of physical therapy specialist is considered to be an organized process of acquisition of biomedical competences and formation of professional qualities, knowledge, skills, experience, values of health preservation which are important for future professional activity. In process of research we specified the integrational aspects of natural-science education which remains in system-synergetic correlation with humanitarian, socioeconomic, professional education and practice of training activity of specialist. They were modified according to the idea of modernization of natural-science education as a system which coordinates the external (social) and internal (personal) sources of specialist to be in accordance with the ways of their optimal use and focus on the professional values.

Natural-science knowledge of physical therapy specialist are considered to be the objective and integrated scientific information combining medical, biological and health-preserving components, based on the level of comprehension of its external and internal correlations and available with the creative personal actualizing of specialist under changeable living conditions as a basis for the formation of natural-science competence [6]. This interpretation of nat-

ural-science knowledge takes account of integration aspect of professional education in a context of system-synergetic unity of cycles and stages of education. The acquisition of natural-science knowledge results in the formation of key and subject competences which is realized in accordance with competence component of developed scientific approach. In process of our research the term “natural-science knowledge” was expanded by health-preserving aspect inasmuch as the cognitive component of competence is the key in formation of health-preserving educational space. That's why in gnoseological context the natural-science competence of physical-therapy specialist to be consists of health-preserving, medical and biological competences.

Modernization of natural-science education of physical therapy specialist is considered to be an improvement of the process of formation of natural-science competence according to the new social demands. This term was modified from the position of optimization of natural-science education by use of information and communication technologies and expanded by health-preserving aspect which makes it possible to regulate the content of separate modules of the programs of disciplines professional course which include the knowledge of health-preserving sphere [7].

Subject natural-science competences are considered to be the system of knowledge and skills form within the complex of disciplines which form the professional qualities of physical therapy specialist and are important for professional activity. Medical competence in the structure of natural-science competence is considered to be the system of knowledge, skills and specific personal qualities within the content of disciplines of medical course (bases of medical knowledge, medicinal physical training, massage) which are required for the solution of educational problems, tasks and situations by specialists. Medical subject competences include general medical, hygienic, ecological, prophylactic, recreational and diagnostic ones. They include knowledge of basic features and manifestation of disease and injuries; complications and risks in cases of pathological states; principles and methodic of use of facilities in process of providing of first aid; specific features of the effect of different environmental factors on human organism for the development of hygienic recommendations, norms and rules of the development of favorable conditions for work, private life and physical training; indications and contra-indications for use of therapeutic physical training; character of exercises which are used for therapeutic physical training, etc [8].

Biological competence is considered to be a complex of knowledge and ways of students' activity which form the highly tailored of information about anatomical structure, physiological functions, biomechanical and biochemical characteristics of motor function which are needed for personal and professional activity. Biological subject competences include anatomic, physiological, biochemical, biomechanical and prognostic ones. Biological competences are considered on the basis of knowledge of structural, functional, biochemical and biomechanical changes in

human organism in process of physical training; mechanism of development of human motor function; metabolic bases of adaptation, etc.

According to theoretical analysis data a competence of a specialist is a combination of the following activity aspects: cognitive (knowledge), operational (methods of activities and availability for work) and axiological (availability of corresponding motives and values). Thus, health-preserving competence is considered to be an integrated personal quality of physical therapy specialist which has a complex system organization. It is also considered to be a unity and correlation of axiological, cognitive and operational components formation of which reflects the availability of physical therapy specialist to preserve and improve physical, mental and social health of patients. Axiological component includes the perception of a system of health formation and keeping healthy lifestyle as the main human value; cognitive component provides for having a system of knowledge of factors and elements of physical and mental health of person and nation; operational component characterizes the experience of behavioral responses and actions in the line of preservation of own health and development of health-preserving educational environment.

Thus, a health-preserving competence is considered to be an integrated personal quality of physical therapy specialist which has a complex system organization and forms a unity, interaction and interosculation of axiological, cognitive and operational aspects, level of formation of which reflects the ability of physical therapy specialist to be to preserve and improve physical, mental and social health of people [9].

Health-preserving competences include the comprehension of basic mechanisms of personal development in different age periods; specific features of effect of different environmental factors on human organism; requirements of assurance of optimal conditions for normal physical development, preservation and improvement of human health; effect of biological rhythms on human health.

In operational context functional elements of health-preservation include: forming function which is acted on the basis of biological and social mechanisms of personal development; information and communication which ensures the transmission of healthy lifestyle experience, traditions, value orientations which form careful attitude to individual health, value of every human life; adaptive – formation of students' orientation to improvement of health, healthy lifestyle, optimization of health status and increasing of tolerance to different stressful factors of natural and social environment; reflexive which lies in re-comprehension of personal experience in preservation and improvement of health which allows to compare real results and perspectives; integration which combines national experience, different scientific conceptions and educational systems on the way to preservation of health of different social groups [10].

In process of solving of the tasks of integration of axiological, cognitive and operational components of natural-science competence of physical therapy specialist to

be we determined the work functions which reflect the specific features of his professional activity, typical tasks and skills which are needed for the process of learning of the disciplines of natural-science course [11].

We determined the main types of skills which are important for physical therapy specialist to be: practical-subject, mental-subject, practical-sign and mental-sign skills. These skills include: 1) ability to act on basis of material media medium; 2) ability to act on basis of constant mental control without any material media medium; 3) ability to act automatically.

Learning function of physical therapy specialist in process of education is realized through the following typical activity tasks: formation of the system of knowledge of physical therapy – professional diagnostic task which include the formation practical-subject skills on a level of constant mental control without any help of material media medium. In process of learning of the disciplines of natural-science course is appropriate to determine the following operation features of competence: ensuring of teaching of theoretical data in accordance with the level of complexity; use of different methods of visual perception in accordance with educational tasks; effective use of didactic principles; assurance of combination of theoretical data and practice.

Educational function in process of professional training of physical therapy specialist is implemented through the following typical professional tasks which include the formation of practical-subject skills and experience on a level of constant mental control: formation of bases of rational behavior, ethic norms and skills in educational process; contribution to the intellectual and aesthetic education [12].

Organizational function in process of education of physical therapy specialist is implemented through typical professional stereotyped tasks which include formation of subject and practical skills on a level of constant mental control: organization of process of physical rehabilitation; this task include the formation of ability to organize the process of physical rehabilitation of people of different age groups and to create the individual rehabilitation system with biomedical requirements compliance.

Development function of physical therapy specialist is implemented through typical professional stereotyped tasks which include formation of subject and practical skills on a level of constant mental control: consideration of characteristics of motion ability, their age dynamics, substantiation of age and individual features of patients to promote development of motor activity; comparison of their dynamic with age norms, injuries prevention.

Planning function of physical therapy specialist includes gaining the experience of planning of educational process and extracurricular work on physical rehabilitation in accordance with age norms and dynamics of work availability of patients [13].

Control function is implemented through the aims of activity which include the formation of subject and practical skills and experience on a level of constant mental

control: determination of the initial level of physical development and physical status of patients, assessment of a level of physical development and degree of training; implementation of operative control in process of physical training which is shown in ability to analyze the indicators of work availability, fatiguability and recreation in training process; implementation of closing control as an ability to accomplish recreational and educational tasks [14,15].

Communication function includes the determination of formal and informal relations with patients in process of physical rehabilitation.

Research function of physical therapy specialist is implemented through the following aims of activity: determination of age and individual specific features of patients; determination of the possible types of physical activity in process of physical training [16].

On a basis of generalization of data of system analysis of research works for the assessment of formation of professional competence of physical training specialists we determined the criteria of their professional competence in the field of natural-science disciplines. Systematization of the results of theoretical analysis of the complex of sources on the problem made it possible to prove that the formation of natural-science competence of physical therapy specialists is an integral unity of a complex of different criteria: professional and motivational, cognitive and methodical, integral and content, functional and reflexive, information and communication, health-preserving, diagnostic and prognostic ones.

Professional and motivational criterion includes the unity of features which determine specialist's ability to self-realization and self-improvement in process of future professional activity. Cognitive and methodical criterion includes the indicators of quality of natural-science knowledge, methodical training and specific features of practical use of biomedical knowledge in process of physical rehabilitation. Information and communication criterion includes the skills and ability of specialists to be to use computer programs, analyze the process of education and training using the international technologies, ability to alternative search of data sources, their critical perception and analysis. Integral and content criterion of natural-science competence includes the ability to implement the intrasubject, intersubject and trans subject integration of knowledge and skills, availability for creative interpretation of practical experience. Functional and reflexive criterion includes the adequacy of specialist's self-appraisal, his ability to identify the other and himself, carry out self-reflection of own activity. Health-preserving criterion includes the indicators of a level of comprehension of a role of valeological culture in process of personal development of specialist to be; specialists' to be acquisition of new knowledge about healthy lifestyle and formation of motivation and value attitude to health preservation and improvement. Diagnostic and prognostic criterion makes it possible to determine a level of specialists' to be acquisition of methods of assessment of health status and dynamics of results of rehabilitation activity [17].

DISCUSSION

In process of analysis of research data we established the fact that works of a number of researchers provide for phased process of formation of specialist's competence. In the context of the defined problem the term "stage of formation of natural-science competence of physical therapy specialists to be" is considered to be a completed period of education which has its own specific features caused by the criteria (stage of development of professional competence; domination of definite types of educational activity; a complex of natural-science disciplines which is peculiar to the stage) and remain in system and structural subordination and synergetic interdependence with other stages of professional education.

We are sure that the structure of stages of formation of natural-science competence of physical therapy specialists to be should include three stages:

1. Professional orientation (opening) stage includes the first and the second years of education of specialist to be. This stage is aimed at the development of professional motivation, basic components of professional competence of physical therapy specialists to be in process of learning of natural-science disciplines. On professional orientation stage the disciplines of biological course (human anatomy, human physiology and biochemistry) are the dominating ones. Medical disciplines are represented by the discipline "Physical therapy theory and practice" which aimed at the formation of basics of medical comprehension of health-preservation. In process of learning of biological and medical disciplines at professional orientation stage of education the specialists to be generalize and extend their knowledge of human body structure, get the basic comprehension of primary integration of knowledge by learning of morphological and functional changes in human organism in process of rehabilitation activity. A discipline "Biomechanics" is considered to be the main discipline on professional orientation stage as it shows the idea of integration of content of natural-science knowledge by means of modelling of a system of intrasubject, intracourse and intercourse integral correlations.

2. Fundamental professional (main) stage includes the third year of education of physical therapy specialist to be. The disciplines of this stage are aimed at the development of professional competence on a basis of general knowledge and skills; learning of the courses of theoretical disciplines of peculiarly professional orientation and practical training in process of which the synchronous approbation of gained experience takes place; development of cognitive, operational and axiological components of natural-science competence in process of practice. This stage include mostly the disciplines of medical course ("Physical therapy in therapeutic and surgical diseases of abdominal cavity organs", "Physical therapy in diseases and disorders of musculoskeletal apparatus", "Paramedic assistance in medical emergencies", "Kinesio taping", etc.). On fundamental professional stage the discipline "General theory of health, diagnostics and monitoring of health status" is considered to be the dominating one, because it

determines the perspective ways of implementation of the idea of optimization of natural-science education on basis of the use of information and communication technologies.

3. Specialized professional (final) stage includes the fourth year of education of physical therapy specialist to be. Natural-science disciplines of specialized professional stage are focused on the development of creative aspects of professional competence the beginning of formation of which was initiated on the previous stages of professional education; doing educational and psychological practical work, internships; projecting for the degree. On this stage disciplines of biological course are dominating ("Biological research methods in physical therapy", "Biological aspects of physical rehabilitation", "Instrumental research methods in physical rehabilitation"); medical subject competences are formed in process of learning of the disciplines "Research methods in medical control" and "Methodology of teaching of adaptation physical rehabilitation". The discipline "Biological research methods in physical therapy" is considered to be the dominating one on specialized professional stage because it realizes the ways of interaction of teachers and physical therapy specialists to be which results in the formation of initiative, independence and creativity of the students, involving them into the research educational activity.

The matter of the problem aspects of natural-science competence of physical therapy specialist to be and stages of its formation is still open to question. At the same time, the problem of development of the structure of integration-functional model of natural-science education of physical therapy specialists to be requires further discussion.

CONCLUSIONS

Thus, we characterized the integrated natural-science competence of physical therapy specialist to be. According to the main scientific ideas of the work we made more exact the basic terms which determine the specific features and patterns of natural-science education of physical therapy specialists to be. The modernization aspects of the terms "subject natural-science competences" and "natural-science knowledge" in the context of competence systemic synergetic approach were modified. The basic terms were expanded from the position of health-preserving and optimization of educational process.

In process of the research were defined: step-by-step specific features of the process of acquisition of natural-science knowledge, functions (educational, organizational, developing, planning, control, communication and research), typical activity tasks (professional, social, domestic, stereotype, diagnostic and heuristic) and types of skills (practical-subject, mental-subject, practical-sign and mental-sign) of physical therapy specialist to be which made it possible to define the criteria of the formation of natural-science competence (professional and motivational, cognitive and methodical, integral and content, functional and reflexive, information and communication, health-preserving, diagnostic and prognostic) and formulate their competence characteristics. The developed criteria and indicators made it possible to

substantiate the development of phased substance of natural-science education of physical therapy specialist to be at higher educational institution.

REFERENCES

1. Antonova O. Bazovi znannia z pedahohiky: stanovlennia, rozvytok, tekhnolohiia formuvannia [Basic pedagogical knowledge: formation, development, formation technology]. Zhytomyr: ZhDPU; 2003, 1–208 p. (in Ukrainian).
2. Zimnyaya I. Klyuchevyye kompetentsii – novaya paradigma rezultata obrazovaniya [Key competences – the new education results paradigm]. Higher education today. 2003; 5:34–42. (in Russian).
3. Kichuk N. Kliuchovi kompetentnosti fakhivtsia yak pedahohichna problema [Key specialist's competences as pedagogical problem]. Scientific bulletin of South Ukrainian national Pedagogical University named after K. D. Ushynsky. 2004; 8(9):53–59. (in Ukrainian).
4. Ovcharuk O. V. Kompetentnisnyi pidkhid u suchasni osviti: svitovi dosvid ta ukraiynski perspektyvy: biblioteka z osvithoi polityky [Competence approach in modern education: world experience and Ukrainian perspectives: education policy library]. Kyiv: «K. I. S.»; 2004, 1–112 p. (in Ukrainian).
5. Haluzynskyi V. Osnovy pedahohiky ta psykholohii vyshchoi shkoly v Ukraini [Bases of higher education pedagogy and psychology in Ukraine]. Kyiv: INTEL; 1995, 1–168 p. (in Ukrainian).
6. Shevchuk T., Sidelnik O. Praktychna pidhotovka studentiv vyshchikh navchalnykh zakladiv yak nevidiemna determinanta formuvannia yikhnikh profesiynykh kompetentsii [Practical training of students of higher educational institutions as an integral determinant of formation of their professional competences]. Scientific bulletin of NLTU of Ukraine. Economic series. 2017; 27(2):189–193. (in Ukrainian).
7. Babych N. Orhanizatsiia ta zmist praktychnoi pidhotovky bakalavriv napriamu «Zdorovia liudyny» [Organization and content of practical training of bachelors of "Human health" course]. Science and education. 2013; 4:60–63. (in Ukrainian).
8. Krupa V. Analiz stanu problemy pidhotovky maibutnikh fakhivtsiv fizychnoi reabilitatsii upedahohichnii teorii ta praktytsi [Analysis of physiotherapy specialists to be education state in pedagogical theory and practice]. Collection of scientific papers of Khmelnytskyi Institute of Social Technologies of the University "Ukraine". Khmelnytskyi: KhlST; 2012; 6: 82–86. (in Ukrainian).
9. Ziuzin V., Zinchenko T. Profesiina pidhotovka fakhivtsiv fizychnoi reabilitatsii v suchasnykh umovakh osvity [Physiotherapy specialists' professional training under modern educational conditions]. Scientific papers of Petro Mohyla Black Sea National University. 2012; 167:113–115. (in Ukrainian).
10. Babych N. Orhanizatsiia ta zmist praktychnoi pidhotovky bakalavriv napriamu «Zdorovia liudyny» [Organization and content of practical training of bachelors of "Human health" course]. Science and education. 2013; 4:60–63. (in Ukrainian).
11. Fastivets A., Khomenko P., Shaparenko I. Conceptual approaches to the investigation of the problem of professional training of physical therapy specialists. Wiadomosci Lekarskie. 2018; 71(3):781–786.
12. Bazylichuk O. Struktura hotovnosti maibutnikh fakhivtsiv z fizychnoi reabilitatsii do roboty z vidnovlennia zdorovia sportsmeniv [Structure of future physiotherapy specialists' availability for work on recovery of sportsmen's health]. Scientific bulletin of National Pedagogical Dragomanov University. Series 15: Physical culture scientific and pedagogical problems (Physical culture and sports). 2016; 3(2): 23–26. (in Ukrainian).

13. Khomenko P. Pryrodnych naukova pidhotovka fakhivtsia fizychnoi kultury [Natural-science education of physical culture specialist]. Poltava: PNPU im. V. G. Korolenka; 2012, 1–380 p. (in Ukrainian).
14. Nedospasova N. Ispolzovaniye zdorovyesberegayushchikh podkhodov pri sozdanii munitsipalnoy obrazovatelnoy seti predprofilnogo obrazovaniya. [Use of health-preserving approaches in process of development of municipal educational network for pre-specialization education]. *Valeology*. 2004; 4:43–44. (in Russian).
15. Viktoriia I. Donchenko, Valeriy O. Zhamardiy, Olena M. Shkola, Olena V. Kabats'ka, Valerii H. Fomenko. Health-saving competencies in physical education of students. *Wiadomości Lekarskie*. 2020;73(1): 145–150.
16. Burenko M. S. Formuvannya fakhovykh kompetentsii maibutnikh treneriv-vykladachiv u protsesi vyvchennia tsykladu profesiino-oriientovanykh dystsyplin [Formation of professional competences of coaches and teachers to be in process of learning of a cycle of profession-oriented subjects]. *Zaporizhzhia*; 2012, 1–224 p. (in Ukrainian).
17. Tsarenko K. V. Rozvytok profesiino-pedahohichnoi kompetentnosti treneriv vykladachiv dytiachycho-yunatskykh sportyvnykh shkyl u protsesi pidvyshchennia kvalifikatsii [Development of pedagogical professional competence of coaches and teachers of children and youth sports schools in process of raising of the level of professional skills]. *Zaporizhzhia*; 2017, 1–284 p. (in Ukrainian).

The research is carried out within the framework of research topic of the Department of biomedical disciplines and physical training of Poltava V. G. Korolenko National Pedagogical University “Theoretical and methodical aspects of natural-science education of physical training specialist-to-be under the conditions of higher education system modernization” (state registration №0117U003237), as well as in the framework of research work state registration number: 0120U100561 “Theoretical and methodological aspects of health care technologies and the development of physical preparation by means of physical education in the process of professional preparation in students’ education.

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Conflict of interest:

The Author declare no conflict of interest.

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Received: 12.11.2020

Accepted: 14.04.2021

A – Work concept and design, B – Data collection and analysis, C – Responsibility for statistical analysis,
D – Writing the article, E – Critical review, F – Final approval of the article