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CHARACTERISTICS OF DIAGNOSTIC INSTRUMENTARIUM OF THE FORMATION OF NATURAL AND SCIENTIFIC COMPETENCE OF FUTURE SPECIALISTS IN PHYSICAL THERAPY AND ERGOTHERAPY

Анотація. У статті наведено характеристику критеріїв, показників і рівнів сформованості природничо-наукової компетентності майбутніх фахівців із фізичної терапії й ерготерапії у процесі професійної підготовки у сучасному ЗВО. Запропоновано низку критеріїв, серед яких: особистісно-мотиваційний, когнітивний, інтеграційно-змістовий, інформаційно-комунікативний, операційно-діяльнісний, здоров'язберігальний і професійно-рефлексивний. Для кожного критерію виокремлено низку показників та рівнів (елементарний, базовий, достатній і творчий) сформованості природничо-наукової компетентності майбутніх фахівців. Особистісно-мотиваційний критерій оцінює сформованість мотивів вивчення природничо-наукових дисциплін, ставлення до них, наявність мотиваційної установки на професійну реабілітаційну діяльність. Інтеграційно-змістовий критерій спрямований на оцінювання ступеня володіння міжпредметними і транспредметними знаннями в галузі природничо-наукових дисциплін, а також сформованості інтегральних знань про сутність і зміст професійної природничо-наукової діяльності майбутнього фахівця з фізичної терапії й ерготерапії. Операційно-діяльнісний критерій характеризують такі показники, як сформованість умінь і навичок виконання професійних завдань з використанням природничо-наукових знань та здатність до самоосвіти. Інформаційно-комунікативний критерій передбачає оволодіння методами отримання інформації відповідно до гіпотез, розвиток умінь розробляти й використовувати сучасні апаратно-програмні засоби в процесі виконання професійних функцій, створювати масиви емпіричних даних, опрацьовувати різноманітні інформаційні джерела, а також здатність працювати з респондентами і співпрацювати з колегами, здійснюючи професійну діяльність. Здоров'язберігальний критерій застосовується з метою оцінки спрямованості професійної діяльності майбутнього фахівця на дотримання здорового способу життя, збереження й відновлення здоров'я інших людей, наявного рівня володіння здобувачем освіти технологіями здоров'язбереження і формування здоров'язберігального професійного середовища. Професійно-рефлексивний критерій дає змогу оцінити здатність майбутніх фахівців усвідомлювати й визначати рівень та результативність власної природничо-наукової підготовки, здатність до саморегуляції, саморозвитку і самовдосконалення, вміння свідомо контролювати результати своєї діяльності, визначати рівень власного розвитку й динаміку особистісного зростання.

Ключові слова: майбутній фахівець з фізичної терапії та ерготерапії, природничо-наукова підготовка, природничо-наукова компетентність, критерії сформованості, показники сформованості, рівні сформованості.

Formulation of the problem. For the creation and implementation of an effective relevant system of the development of natural and scientific competence of future specialists in physical therapy and ergotherapy, a topical task is to measure the dynamics of the progress of such development and to clarify the nature of changes in the levels of development of the components of this competence at various stages of the pedagogical experiment. At the same time, it should be taken into account that pedagogical diagnostics aims to study the effectiveness of the natural and scientific training process with the help of a scientifically based

instrumentarium basing on the assessment of level changes in the criteria of the formation of competence of the studied category of specialists.

Analysis of recent publications and research. The issue of training of future specialists in physical therapy (rehabilitation) and ergotherapy for professional activity is described in the scientific works of N. Bielikova, A. Hertsyk, O. Dubohai, T. Diachenko, V. Zavatskyi, V. Kuksa, Y. Liannoi, M. Romanyshyna, L. Sushchenko, P. Khomenko. Peculiarities of natural and scientific training of specialists were studied by A. Antonets, H. Biletska, V. Bilyk, A. Drobin, V. Makarenko, S. Naumenko, M. Paikush, L. Rybalko, T. Temerivska, I. Tkachenko, and others. At the same time, the criteria, indicators and levels of formation of natural and scientific competence of future specialists in physical therapy and ergotherapy in the process of professional training in modern higher education institutions are actually not studied.

The purpose of the article is to develop a diagnostic instrumentarium for assessing the level of formation of natural and scientific competence of future specialists in physical therapy and ergotherapy.

Presentation of the main material. Scientists identify measurement as an algorithmic operation aimed at assigning certain objects (subjects, processes or states) with defined numerical equivalents in accordance with the pre-formulated rules. At the same time, the measurement process is conducted by establishing a quantitative relationship between a certain characteristic of the object and the value that is taken as a standard (Fediienko, 2009). In pedagogical research such a standard is traditionally considered to be the criteria of formation.

On the basis of existing definitions and characteristics, we interpret the criteria of the formation of natural and scientific competence as a set of objective signs that make it possible to determine the state and level of effectiveness of the natural and scientific training of a future specialist in physical therapy and ergotherapy using a set of specific indicators and characteristics.

By the indicator we understand the description of the characteristics of the object, which is essential and relevant in the process of evaluation. This is primarily a value that characterizes the quantitative characteristics of a phenomenon or a component of the development process. Determining the criteria and indicators of the formation of natural and scientific competence of future specialists in physical therapy and ergotherapy, we are inclined to interpret the ratio of criteria and indicators as general, specific and special, for which we consider a criterion as an existing property of an object or phenomenon that unites the totality of empirical indicators of its formation, while the parameter reflects certain specific qualitative aspects of their study (Huzii, 2007).

Analysis of the experience of professional training of specialists in physical therapy and ergotherapy, study of a set of scientific sources, analysis of the standard of training of future specialists and the educational and professional program allowed us to distinguish a system of criteria of the formation of natural and scientific competence, which includes the following criteria: personal and motivational, cognitive, integrative and substantial, operational and activity orientated, informational and communicative, health-keeping, and professional and reflexive.

The personal and motivational criterion is a set of motives and personal attitudes that encourage the future specialist in physical therapy and ergotherapy to develop natural and scientific competence. The personal and motivational criterion reflects the axiological and stimulating functions of the natural and scientific activity of the future specialist and includes a system of motives and needs, personal values and beliefs that regulate the professional activity of a physiotherapist and an occupational therapist. The indicators of this criterion are focused on the quantitative and qualitative assessment of the formation of motives of natural and scientific knowledge acquiring, abilities and skills, among which the motive for achieving success and a positive attitude towards the chosen profession dominates. We proposed as such indicators: 1) awareness of the social order for the formation of natural and scientific competence of a specialist in the field of rehabilitation and personal focus on its formation and improvement; 2) understanding of the personal value of natural and scientific training; 3) the ability for self-realization and self-improvement in the professional area.

The cognitive criterion determines the level of mastery of higher education applicants of theoretical natural and scientific knowledge and practical skills, which are the basis of professional growth in rehabilitation and health-improving activities. Justifying the volume of natural and scientific knowledge, we consider it expedient to take into account the dynamics of learning of professional concepts, the degree and nature of their content revealing, as well as the skills of establishing hierarchical, structural and functional dependencies between them. Achieving the appropriate level of theoretical training of higher education applicants is primarily necessary for future specialists to be able to rationally apply the acquired knowledge and skills for effective and high-quality performance of professional tasks. The main indicators of this criterion include the level of mastering of basic knowledge from natural and scientific disciplines and the critical thinking formation.

Integrative and substantial criterion is a system of integrated natural and scientific knowledge, knowledge about the subject and methods of rehabilitation and health-improving activities, as well as

professional natural and scientific thinking, directing attention, perception, memory, actions and operations, which are necessary for the successful implementation of professional activity. The integrative and substantial criterion provides an opportunity to evaluate the future rehabilitators' knowledge of the types of scientific biological knowledge, understanding of their structural and logical subordination caused by the genetic connection with biological science, knowledge of the main natural and scientific hypotheses, laws, regularities, principles, theories and basic methods of biological research.

Among the indicators of the formation of this criterion, we include the following: 1) possession of interdisciplinary and transdisciplinary knowledge in the field of natural and scientific disciplines; 2) formation of integral knowledge about the essence and content of the professional natural and scientific activity of the future specialist in physical therapy and ergotherapy.

Operational and activity orientated criterion is the ability to establish structural and logical connections between the main types of scientific natural and scientific knowledge, to explain the stages of their assimilation in the system of professional training of a specialist in physical therapy and ergotherapy; the ability to solve typical situational practice-oriented problems, to use methods of biological research during laboratory and practical works performing, in biological experimentation and during production practices. The operational and activity orientated criterion is focused on the assessment of the ability to make effective decisions independently, to develop and justify one's own approaches to professional tasks solving using natural and scientific knowledge, and to evaluate the effectiveness of the used approach.

We determined the indicators of the operational and activity orientated criterion of the formation of the natural and scientific competence of a future specialist in physical therapy and ergotherapy: 1) the ability to make effective decisions independently, develop and justify one's own approaches to professional tasks solving using natural and scientific knowledge; 2) the ability to perform typical situational practice-oriented tasks, to use methods of biological research; 3) mastering the methods, ways and experience of independent performance of professional and practical tasks.

The informational and communicative criterion makes it possible to assess the level of formation of knowledge about types of information search, information and bibliographic resources, search for necessary information in the Internet, methods and means of information search, sources of information, search systems, principles of information selection, technologies of its preservation, methods of analysis and processing, as well as types of information synthesis. The informational and communication criterion was evaluated by us according to the following indicators: 1) knowledge of the theory of informational and communicative technologies (ICT) and methods of their use during the study of natural and scientific disciplines; 2) the ability to develop and use modern hardware and software means in the process of professional functions performing; 3) knowledge of the norms of verbal and non-verbal communicative behavior, which are necessary for professional and everyday communication.

The health-keeping criterion is used to conduct a quantitative and qualitative assessment of the level of formation of knowledge about health and the impact of negative environmental factors on it, mastery of the basics of health-keeping technologies, which is a determining factor in the process of the health-keeping activities of a specialist in physical therapy and ergotherapy, as well as the higher education applicant's awareness of the importance of such knowledge for his or her future development as a specialist. Health-keeping indicators determination requires a preliminary identification of the level of awareness of the future specialist in physical therapy and ergotherapy of the importance of natural and scientific training in the process of forming a culture of health-keeping, assimilation of new knowledge about a healthy lifestyle by education applicants, the formation of a motivational and valuable attitude towards keeping and strengthening of one's own health and the health of other people, as well as mastering modern methods and means of diagnosis, keeping, strengthening and restoration of health.

Thus, the indicators of the health-keeping criterion of the formation of the natural and scientific competence of the future physiotherapist and ergotherapist include: 1) orientation of the professional activity of the specialist at maintaining a healthy lifestyle and preserving and restoring the health of others; 2) mastering of modern health-keeping technologies and principles of health care professional environment formation.

The professional and reflexive criterion evaluates the ability of the future specialist in physical therapy and ergotherapy for self-control and self-evaluation, his or her focus on self-improvement of professional and personal qualities in the process of natural and scientific training. It also provides that the higher education applicant should have an ecological awareness. In addition, value orientations and the level of formation of the professional consciousness of the future specialist are systematically evaluated. The indicators of this criterion reflect the efficiency and effectiveness of the practical application of natural and scientific knowledge and skills acquired by education applicants in the process of self-education, their ability to use this knowledge while solving productive and professional tasks, as well as to navigate the variety of social rehabilitation requests that can be solved with the help of self-education.

Indicators of the professional and reflexive criterion of the formation of natural and scientific competence of a future specialist in physical therapy and ergotherapy are: 1) the formation of the ability for self-control, self-analysis and self-evaluation of the results of natural and scientific training; 2) the desire to increase the level of natural and scientific competence, self-improvement and self-development.

The next step of the research is the differentiation of the criteria and indicators developed by us at the level of formation. We propose to evaluate the formation of criteria and indicators of natural and scientific competence of future specialists in physical therapy and ergotherapy at the following levels: elementary, basic, sufficient and creative. In our opinion, this scale is the most relevant to the specifics of the object we research.

The elementary level is characterized with the absent or temporary motivation for natural and scientific training and professional development, cognitive inertia. A higher education applicant is not yet able to master new biological concepts and terms independently. He or she partially performs reproductive actions, shows episodic interest in learning and performs minimal independent activities. This level is characterized with the situational nature and lack of purposefulness of all natural and scientific training. Professionally important (legal, documentological, managerial, psychological and pedagogical, methodical, communicative, informational and technological, analytical and statistical, health-keeping) knowledge, in particular about the organization of the health-keeping process, is chaotic, superficial, unstable and unsystematized. At the same time, there is an inadequate, as a rule, overestimated self-assessment of the level of one's own professional competence. Respondents with an elementary level do not show interest in professional activity and do not realize its significance, do not see the need for professional growth, self-improvement and self-development, and their cognitive interest is weakly expressed. Professionally important personal qualities, in particular endurance, poise, self-control in professional activities, the ability to resist negative emotional influences, observe the established order and maintain discipline, are insufficiently developed.

The basic level is characterized with the fact that a future specialist in physical therapy and ergotherapy begins to form a motivational and valuable attitude to natural and scientific training, but the motivation is not stable and has an episodic character. The applicant is not able to apply the acquired natural and scientific knowledge independently while performing new practice-oriented tasks, focuses on typical tasks, sometimes performs tasks according to an algorithm, is able to master new educational material only under the guidance of a lecturer. A superficial awareness of the content, methods and ways of performing professional tasks leads to a significant number of drawbacks in their performance. Inadequate development of professional (informational and technological, organizational and managerial, communicative, legal, social and psychological) skills is inherent to the basic level of formation of natural and scientific competence. Thus, self-control, correction of one's own activities, ability to self-organize and plan one's professional activities are practically absent. There is also a lack of willingness to take responsibility for the quality and results of the work performed.

A sufficient level presupposes that the education applicant has value orientations and motives of natural and scientific training and a developed emotional and volitional mechanism for difficulties overcoming during self-education. He or she performs typical practice-oriented tasks independently, has the ability to self-assess his or her own capabilities in the self-educational activities performing and strives to work on himself or herself constantly in the process of natural and scientific training. Professionally important (documentological, legal, managerial, communicative, methodical, psychological and pedagogical, informational and technological, analytical and statistical, health-keeping) knowledge is systematized partially. At the same time, there is superficial understanding of the need to use them when performing professional tasks. Incomplete familiarity with the content, methods and ways of performing professional tasks leads to insufficient accuracy and the presence of a small number of drawbacks in their performance. Future specialists in physical therapy and ergotherapy with a sufficient level of formation of natural and scientific competence have a limited ability to self-organize and plan their professional activities. They have not fully formed skills of self-control and self-analysis of their own activities. Self-assessment of the level of professional competence is not always adequate (underestimated or overestimated). Respondents with this level of competence formation demonstrate the ability to act according to a model, that is, to reproduce a certain sequence or system of actions in typical professionally-oriented situations. Interest in professional activity is situational, incomplete awareness of its importance and contradictory attitude is manifested. Strives for professional growth, self-improvement and self-development are insufficiently developed and unsystematic, cognitive interest is unstable.

The creative level is characterized with the formed need of future specialists for natural and scientific training, the desire to master new knowledge, abilities and skills, conscious planning of actions for the implementation of practically-oriented tasks and their solution in the most rational way. The motivational component is based on the internal motives of the personality. Applicants show cognitive motivation and strive to conduct the self-educational activities constantly. Psychological and pedagogical, methodical, communicative, informational and technological, analytical and statistical, and health-keeping knowledge are stable and systematized. Stable accuracy in the performance of professional tasks and an insignificant number

of drawbacks are due to full awareness of the content, methods and ways of their implementation, as well as the ability to apply professionally important knowledge into professional activities. In typical and atypical production situations, the applicant demonstrates the ability to reproduce a certain sequence of actions independently. Creation of own methods is observed in performing professional tasks. A high level of self-organization and the ability to plan, control, regulate and analyze one's own activities is inherent. A sufficient level of formation of natural and scientific competence is characterized with a willingness to take responsibility for the quality and results of the work performed, to assess one's own level of competence formation adequately. The creative level of formation of the natural and scientific competence of future specialists in physical therapy and ergotherapy is manifested in a positive attitude to professional activity, the presence of a stable motivation to improve competence, a constant desire for self-improvement and self-development. Future specialists have a desire to achieve high professional results and constant career growth. They have fully formed professionally important personal qualities, in particular, the desire to spread new knowledge and skills among colleagues, readiness for cooperation and mutual assistance, the ability to realistically assess the situation and adapt to production circumstances.

Conclusions. The theoretical analysis of studies on the problem of the formation of natural and scientific competence of future physical therapists and ergotherapists, taking into account the requirements of the educational and qualification characteristics and the results of the survey of independent experts made it possible to distinguish a number of criteria and levels of formation of the studied competence of future specialists. For each criterion of the natural and scientific competence of a future specialist in physical therapy and ergotherapy, we determined the indicators that characterize its formation. The substantiation of the pedagogical essence, components, criteria, indicators and levels of formation of the natural and scientific competence of future specialists in physical therapy and ergotherapy is laid as the basis of predictions diagnostic and is summarized at the stages of ascertaining and forming experiments.

The article describes the criteria, indicators and levels of formation of natural and scientific competence of future specialists in physical therapy and ergotherapy in the process of professional training in modern higher education institutions. A number of criteria are proposed, including: personal and motivational, cognitive, integrative and substantial, informational and communicative, operational and activity orientated, health-keeping, professional and reflexive. For each criterion, a number of indicators and levels (elementary, basic, sufficient and creative) of the formation of natural and scientific competence of future specialists are distinguished. The personal and motivational criterion assesses the formation of motives for studying natural and scientific disciplines, the attitude towards them, the presence of a motivational attitude towards professional rehabilitation activities. The integrative and substantial criterion is aimed at assessing the degree of possession of interdisciplinary and transdisciplinary knowledge in the field of natural and scientific disciplines, as well as the formation of integral knowledge about the essence and content of professional natural and scientific activity of the future specialist in physical therapy and ergotherapy. The operational and activity orientated criterion is characterized with such indicators as the formation of skills and abilities to perform professional tasks using natural and scientific knowledge and the ability to self-education. The informational and communicative criterion involves mastering the methods of obtaining information in accordance with hypotheses, developing the ability to create and use modern hardware and software means in the process of professional functions performing, creating arrays of empirical data, processing various information sources, as well as the ability to work with respondents and cooperate with colleagues, conducting professional activities. The health-keeping criterion is used to assess the orientation of the professional activity of the future specialist for maintaining a healthy lifestyle, keeping and restoring the health of other people, the existing level of knowledge of the education applicant of health-keeping technologies and the formation of health-keeping professional environment. The professional and reflexive criterion makes it possible to assess the ability of future specialists to realize and determine the level and effectiveness of their own natural and scientific training, the ability to self-regulation, self-development and self-improvement, the ability to control the results of their activities consciously, to determine the level of their own development and the dynamics of personal growth.

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ANNA FASTIVETS

CHARACTERISTICS OF DIAGNOSTIC INSTRUMENTARIUM

OF THE FORMATION OF NATURAL AND SCIENTIFIC COMPETENCE OF FUTURE SPECIALISTS IN PHYSICAL THERAPY AND ERGOTHERAPY

Annotation. The article describes the criteria, indicators and levels formation of natural and scientific competence of future specialists from of physical therapy and occupational therapy in the process of professional training in modern higher education institutions. A number of criteria are proposed, including: personal and motivational, cognitive, integration-content, information-communicative, operational, health-care and professional-reflective. For a number of indicators and levels are distinguished for each criterion (elementary, basic, sufficient and creative) formation of natural and scientific competence of future specialists. The personal and motivational criterion evaluates the formation of motives for studying natural and scientific disciplines, attitudes towards them, the presence of a motivational attitude towards professional rehabilitation activities. The integration-content criterion is aimed at evaluating the degree possession of interdisciplinary and transsubjective knowledge in the field of natural sciences, as well as the formation of integral knowledge about the essence and the content of the professional natural and scientific activity of the future specialist physical therapy and occupational therapy.

Key words: future specialist in physical therapy and ergotherapy, natural and scientific training, natural and scientific competence, criteria of formation, indicators of formation, levels of formation.