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PHYSICAL EDUCATION AND HEALTH-IMPROVING
COMPETENCES OF FUTURE NUCLEAR INDUSTRY
SPECIALISTS

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Abstract

In this study the physical education and health-improving competencies notion provides a rationale for the relevance of its formation for future specialists in the nuclear industry. Also the authors give a definition of the competency, identify its structural constituents through a system approach, as well as the rationale for its intrinsic character in pedagogical studies.

A basis of physical education and health-improving competencies consists of the following competencies: OK-7 (general cultural competences) - the ability to assess critically their strengths and weaknesses and to identify ways of advantages development and deficiencies correction; OK-13 - a graduate's practical application of physical education and health-improving methods independently and methodically correct. In addition, there are such competences as DK-1 (recreation and health-improving competencies) - the ability to organize independently active recreation and classes on working capacity restoration with use of means of physical education and sports; the DK-2 (rehabilitative competency): knowledge of the complexes of rehabilitation exercises in various diseases and functional impairments of the body. It is necessary to mention about one more competence – DK-3 (healthy lifestyle competency): knowledge of the development motor activity peculiarities in different periods of the personality development; possession of basic motor skills and abilities in the field of physical education; organization and doing of independent physical exercises.

In the definition of the competency, the authors used a system approach that provides the scientific basis of the system and its functioning, as well as an analysis in the light of many pedagogical factors.

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Keywords: Competency, competence, system approach, physical education, motion activity, structure.



1. Introduction

Students represent a major intellectual and productive potential of society, and the physical health of the modern boys and girls depends largely on sustainable socio-economic state development and its national security.

A large part of young people has deficiencies during their morphofunctional formation at school age. Many scientists note with particular concern an insufficient physical activity level of the younger generation in the Russian Federation. The specialists, dealing with the biological, biochemical, medical and physiological systems of the human body functioning, state that the volume of students physical load does not meet modern requirements of biological rules. Thus excessive mental work leads to a decrease in level of physical activity and the health deterioration. Moreover, there is a tendency towards a decline of the value of students' relation to their health; as a result, their motivation for physical exercises steadily decreases.

These problems are also characteristic for nuclear universities. In particular, at Dimitrovgrad Engineering and Technological Institute of the National Research Nuclear University "MEPHI" (DETI NRNU MEPHI), the students are divided into two groups in PE classes according their health status and sex: a general group and a special medical group. The students who have various diseases are enrolled in a special medical group. We have identified the following situation: an annual increase of the number of first-year students with various physical and health disabilities. This information indicates that serious negative changes in the organism functioning start as early as in adolescence. So in the academic year 2011/12 5.6% of all first-year students were enrolled in special medical group but in the academic year 2016/17 their number increased to 7.9%.

Furthermore, in accordance with the educational standards of independent study the core curricula complexity level and the work volume have significantly increased which require students to be mentally active and organized, to have willpower, and to develop convergent and divergent thinking. Hence the students face to the following problems: the lack of free time for their leisure activities and for doing sports, noncompliance work-rest regime. Thus, the lack of physical activity produces pathological changes in the functioning of the vital systems of the body, first of all, the cardiovascular

2. Problem Statement

In the light of these data, the search for the most convenient methods to regenerate the functional organism state is the key process to train students for nuclear industry. High level health is a requirement of the specifics of production activities for successful professional responsibilities.

In view of this situation, the issue of physical education and health-improving competencies formation is, of course, at the forefront in the training process of the atomic industry specialists. First of all, this issue requires a completion of the following fundamental research tasks:

1. To reveal the physical education and health-improving competencies notion and their meaning in the atomic industry specialists formation and to give its author's definition;
2. To identify the structural components of the competency through the system approach and to justify its intrinsic character in pedagogical research.

3. Research Questions

The beginning of construction works of the Federal hi-tech medical radiology centre in 2010 in *Dimitrovgrad* contributed to the further development of Nuclear Innovation Cluster of *Dimitrovgrad*. However, by the end of construction works, the Centre will have faced a lack of nuclear industry specialists. In the near future, it will need approximately 1,500 specialists.

DETI NRNU MEPHI is an institute provided with sufficient scientific, pedagogical, and logistic resources for training of future specialists of different levels to help to resolve the medical radiology centre personnel problem.

The issue study is based on the study of bachelors training in 14.03.02 – Nuclear physics and technology in accordance with the State educational standards and the employers' requirements. Being presented by numerous parameters of education, the State educational standard is a reference standard for the modern society as considered students' possibilities correspond to the practical expression of educational system (Philosophical encyclopaedic dictionary, 2003, p. 230)]

4. Purpose of the Study

The purpose of the study is to complete the tasks above to create an efficient system model of physical education and health-improving competencies formation and to justify it in theory, as well as to create an effective evaluation criteria system to determine the level of competency achievement by the students at any stage of their training

5. Research Methods

To reveal intrinsic character and the meaning of physical education and health-improving competencies notion, we used a system approach. The chosen method provides a better understanding and a rethinking of the competency notion as a mode of personality systemic education, as well as allows us to analyze its structure and to give its theoretical and methodological justifying.

The system approach is used in pedagogics as one of the fundamental theoretical and methodological foundations of research.

The main purposes of this approach implementation are as follows: to describe the system structure, to identify its structural components and their interaction and functions, and to determine factors affecting its stable existence and development.

The system approach is applied to phenomena belonging to the category of systems" (Polonsky, 2004, p. 151).

In the pedagogical research, this approach was first used by Korolev (1970).

Therefore the above-mentioned observations confirm the need to apply the system approach to structure physical education and health-improving competencies and a PE classes program and to ensure their implementation. Pranguishvili (2000, p. 21) emphasizes the methodological approach significance in pedagogical research and insists that such fundamental, interrelated, complementary approaches such as: informational, system and synergetic ones become essential tools in methodological determination in scientific researches. The system approach is essentially a universal method of objective reality cognition.

The pedagogical systems studies engaged by many Russian scientists such as Bespalko V. P., Tatur Yu. G., Kuzmina N. V., and others.

The system approach as a whole concludes a number of scientific methodological principles that help researchers to identify the characteristics of the internal linkages between the system elements and the specifics of system relationships with other associated system elements

6. Findings

To rethink the significance of the health improving practices implementation during the training of students, these are some competencies to develop relying on educational standards:

1. OK-7: the ability to critically assess their strengths and weaknesses and to identify ways of advantages development and deficiencies correction
2. OK-13: a graduate's practical implementation of physical education and health-improving methods independently and methodically correct, a graduate's capacity to achieve the proper level of physical preparedness to ensure the full social and professional activities.

In addition, the JSC "SSC RIAR" employers' requirements for additional competencies development as well as educational standards implementation by our university have obvious value and applied significance. We need thus focus on detection of the meanings of competences additionally proposed by employers.

DK-1 (recreation and health-improving competencies): the ability to independently organize active recreation and classes on working capacity restoration with use of means of physical education and sports. Being a part of bio-social spheres, a person is included in the sphere of sociocultural relationships, but the huge flow of information in the modern world is a source of the positive and the negative social factors impacting a personality. In the current conditions, an atomic sector is in urgent need for nuclear industry specialists having a high level of physical training and physical health. Work environment involves setting of various compensatory physical exercises that help to reduce tiredness, psychological and emotional stress, overexertion caused by physical overload, etc., because professional activity and natural physical development are not means to resolve person's health problems.

Today health is interpreted in terms of social, psychological and biological approaches (Anischenko, 1999; Aseev, 1967). The subject area of physical recreation, as can be seen, is multi-aspect and is of interdisciplinary nature.

DK-2 (rehabilitative competency): knowledge about the exercises impact on the recovery processes of the lost body functions; the ability to competently provide the first medical aid in a workplace and in other situations; knowledge of the complexes of rehabilitation exercises in various diseases and functional body impairments.

This competency had taken on new importance in view of classes' organization with a competency-based approach. Physical activity and sport are especially important for active recreation and recovery and help to keep a good physical form and a stable health in the modern world.

DK-3 (healthy lifestyle competency). This competency is focused on strengthening of the general physical training: on strengthening of the physical, moral and volitional qualities and learning physical skills. The general physical training is a complex of motor exercises that allow achieving a basic level of

physical preparedness. Knowledge and doing motor exercises of mass sports, martial art, and others confirm the required level of physical preparedness. The intensive student's organism development proves the necessity of keeping a high level of physical training.

At present there are a great number of studies and developments that facilitate a competency-based approach understanding and its implementation in the modern education process. In particular, the intrinsic character of competency model implementation in terms of different levels of educational systems and specialists formation was analysed by such scientists as Dahina A. N., Davydova V. V., Zeer E. F., Zimnyaya I. A., Ilmushkina G. M., and others.

All of the existent "competence" definitions are united by their usage in marking a high level of specialist's professional skills. The competence is, in fact, an integral person's feature that includes a multitude of interrelated and complementary components. In other words, the person's competence represents his potential and its implementation capacity. In summary, it is a number of some competencies that determine the activity competence.

A comparative analysis of "competence" and "competency" concepts, the requirements of educational standards for the nuclear specialties in Physical Education Course, as well as the requirements for Nuclear Innovation Cluster employers of Dimitrovgrad allow us to identify the physical education and health-improving competence for future specialists in the nuclear industry as a mean of system education of a personality that consists of: recreation and health-improving competencies, rehabilitative competency, healthy lifestyle competency; competency of correct application of physical education and health improving methods; consciousness of own needs, value orientation and personality motivation for necessary physical form achievement during all the life and for social and professional activities in the nuclear industry; and necessary personal qualities.

A competencies structure (below) is based on a physical education and health-improving competencies definition (above) according to physical education educational standards in the nuclear industry (fig. 1).

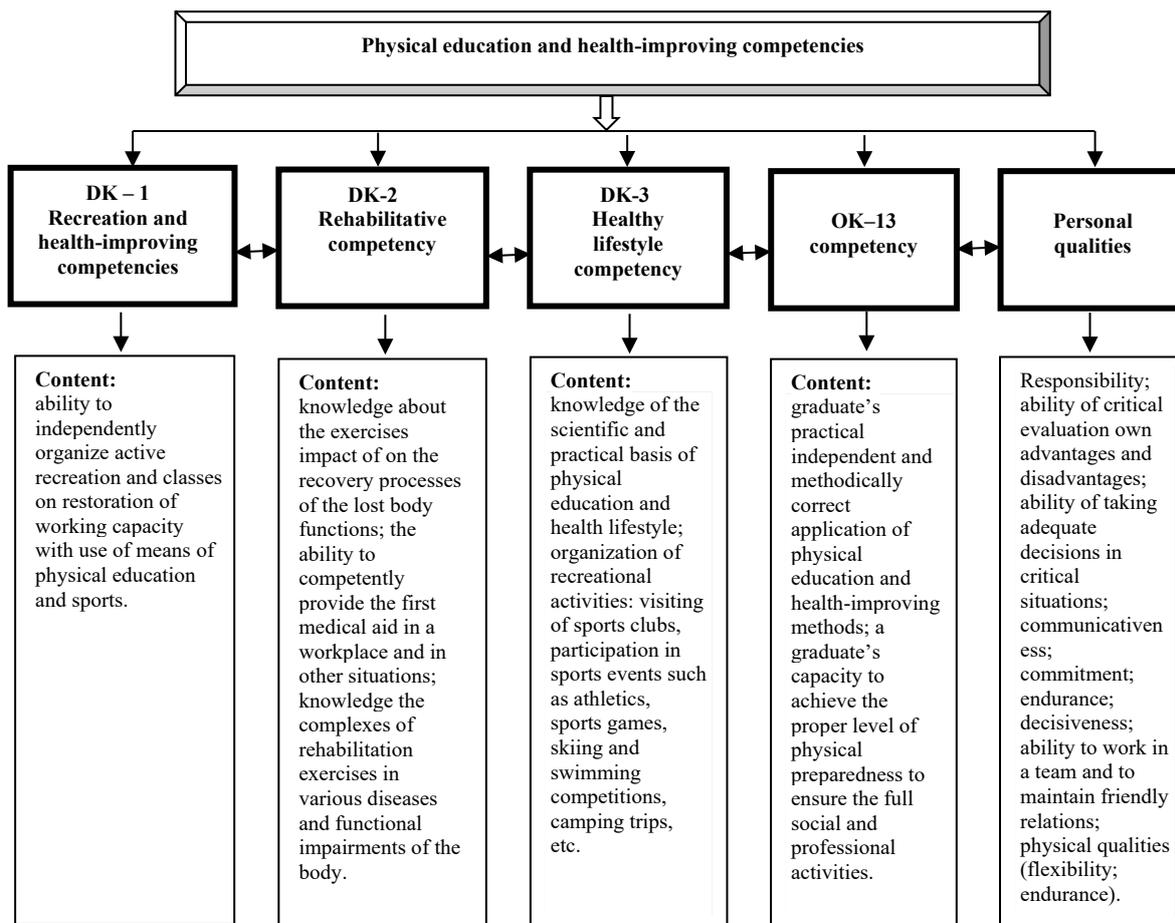


Figure 01. The structure of the physical education and health-improving competencies

Relying on educational standards requirements and the physical education and health-improving competencies notion, these components of the competencies were determined on a basis of system analysis: cognitive (knowledge of health improving activities and students’ skills); motivational and value; activity oriented and personal components.

It should be noted that the system approach realization in a physical education system in Russia was studied by Grigoriev, Piskun and Pogodin (2016), Kiuru and Popova (2016); Lukiyanenko (2016), Manzheley (2016), Nayn and Gareeva (2016), Opletin (2016), Stroeva (2016), Serikov and Serikov (2016). The role of health promotion competency in physical education in the university learning process was particularly studied by Ilmushkin, Sudakova, and Parhaeva (2016).

7. Conclusion

The analysis of professional competencies and the types of professional activities of nuclear industry specialists proves that the physical education and health-improving competencies formation plays a crucial role in the quality improving of future atomic industry specialists training.

System approach allowed one to identify the nature and the content of physical education and health-improving competencies and to determine their components: cognitive, motivational and value, activity

oriented and personal components. Such choice facilitates a deep understanding of studied competency, as well as its structure analysis and theoretical and methodological foundation.

The results of the study are the source to continue the study and give an opportunity for further theoretical foundation and building of a model of physical education and health-improving competencies formation for future atomic industry specialists, as well as allow an effective evaluation criteria and diagnostic system formulating.

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