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Forming Competency in Health Promotion in Technical Specialists Using Physical Education

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Abstract: In the light of new information, environmental, educational and production conditions, the problem of creating a health-promoting environment in a technical university appears to be rather important and needs to be studied in detail. The research aims to develop, justify and experimentally verify pedagogical conditions for forming competency in health promotion in technical students using physical education. The experiment involved two groups of students (Years 1-4): 241 individuals in the experimental group (EG) and 237 individuals in the control group (CG). Research methods include pedagogical observations, surveys, tests, self-evaluation, expert evaluation of students' practical skills, analysis of personal valeological and sport diaries of students; modelling in the framework of ascertaining and formative stages of the experiment; quantitative analysis of empirical data and its quality presentation; statistical verification of the proposed pedagogical conditions and the research hypothesis, the use of relevant tests (the Ruffier test, the Cooper test) and quantitative indicators (Student's t-test) in order to obtain some objective data on the results from the implementation of the author's model. At the end of the experiment, most respondents (80 %) in the EG have reached a high level of competency in health promotion using physical education. In the CG, the differences in levels have not shown any significant changes since only 32.5% of respondents have a high level. Therefore, the results of the pedagogical experiment show some positive dynamics and confirm the effectiveness of the designed model and technology for forming competency in health promotion in technical students using physical education, which has made it possible to create qualitatively new conditions of the educational process and enhance students' motivation towards developing and realizing values in this field.

Keywords: *pedagogical conditions, model, technical university, kinetic activity, educational environment.*

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Introduction

The strengthening of Ukraine's production capacity and increase in the GDP are directly related to the professional activities of technical specialists. Thus, pedagogy of higher education should aim to determine and ensure proper working conditions and form future specialists' internal motivation, need and culture of health promotion and, therefore, expediently use and increase physical, psychological and professional resources of the individual, which will lead to effective professional performance, self-realization and self-development.

In the early 21st century, various scholars paid attention to the creation of the environment and activities of young people and studied the negative effects of educational and extra-curricular conditions and prospects for their optimization. Such scholars as A. Domashenko (2003), V. Filinkov (2003), V. Prykhodko (2004), I. Saluk (2004), N. Melnyk et al., (2019), M. Sheremet, Z. Leniv, V. Loboda, & B. Maksymchuk (2019), I. Gerasymova et al. (2019), L. Byvalkevych, O. Yefremova, & S. Hryshchenko (2020), L. Sebalo & T. Teslenko (2020), V. Koziuk, Y. Hayda, O. Dluhopolskyi, & S. Kozlovskyi (2020) focused on psychological and valeological aspects of students' health. At the same time, A. Domashenko (2003) and V. Filinkov (2003) studied the negative influence of working conditions on the health of technical students. The optimization of educational conditions and improvement of students' health using physical education were analyzed by R. Bailey (2010), O. Hladoshchuk (2008), H. Hryban (2012). The theory and methodology of physical education and healthy lifestyles were clarified by O. Khudolii (2007) and B. Shyian, & O. Vatseba (2008).

In Ukrainian scientific discourse, the problem of forming competency in health promotion and valeological culture in students has been rather widely covered (Bakhmat et al., 2019; Behas et al., 2019; Bezliudnyi, Kravchenko, Maksymchuk, Mishchenko, & Maksymchuk, 2019; Byvalkevych, Yefremova, & Hryshchenko, 2020; Gerasymova et al., 2019; Halaidiuk et al., 2018; Kaletnik, Zabolotnyi, & Kozlovskyi, 2011; Koziuk, Hayda, Dluhopolskyi, & Kozlovskyi, 2020; Kozlovskyi, 2010; Makoviichuk et al., 2020; Maksymchuk et al., 2018; Melnyk et al., 2019; Sebalo & Teslenko, 2020; Sheremet, Leniv, Loboda, & Maksymchuk, 2019; Sitovskyi et al., 2019). Indeed, the problems of preserving students' health and forming their competency in health promotion were explored within the framework of forming competencies which are universal for HEIs (Voronin, 2006); with the focus on organizing students' independent work (Bezuhla,

2009). The problem of forming competency in health promotion and valeological culture in students was elaborated taking into account motivational and personal aspects rather than competency-based one (Bagnetova, 2004); through analyzing the effectiveness of the implemented model of the methodical system for physical education of students (Hryban, 2012); based on the informative indicators of students' health.

Nowadays, pedagogical conditions are considered to be the main concept of pedagogy summarizing material, technological and resource tools since they can be specifically created to achieve a specific educational goal and be discretely analyzed in the framework of designing a model of educational activities. In the context of the theory and methodology of professional education, pedagogical conditions for forming professional competency of technical specialists are rather important as it is necessary to urgently strengthen Ukraine's production capacity. According to the conducted studies, more than half of graduates from technical universities are unable to withstand the modern rapid pace of information, communication and production.

The initial data collected during the preliminary diagnostics (a 95% reliability) and involving cognitive, motivational, medical, physiological and physical indicators of Year 1 students show low awareness of health promotion and activity. They have also made it possible to design a preliminary theoretical and methodological structure for forming competency in health promotion, which manifests itself in the need to implement the following components in the educational process: organization – motivation – participation – diligence – activities – values – awareness of health promotion.

The analysis of the above-mentioned programmes and provisions, relevant literature and propaedeutic observations of technical students proves that it is essential to design an effective model of health promotion for these students and to provide it with specific technological tools in the framework of implementing an elective educational course on physical education in the educational process. The relevance of this research lies in the need to design and verify the model for forming competency in health promotion in technical students using physical education and explicate specific pedagogical conditions and instrumental and resource aspects of optimization.

The research hypothesis is based on the assumption that the level of competency in health promotion in technical students will increase under the following pedagogical conditions: optimizing organizational and interactive educational activities of students during physical education classes;

promoting independent forms of educational physical activities; adjusting the content of the course on physical education taking into account the specifics of professional activities of technical students. The research aims to develop, justify and experimentally verify pedagogical conditions for forming competency in health promotion in technical students using physical education.

Material & methods

To determine and justify the main structural components of competency in health promotion, a consistent gradational scheme for forming students' competency in health promotion has been designed. Its components constitute several planned measures under appropriately changed pedagogical conditions. The theoretical and methodological structure recognizes an awareness of health promotion, competency in health promotion and health promotion activities, which are practically manifested in the gradual and systematic forming of such consistent components as *organization – motivation – participation – diligence – activities – values – awareness of health promotion*. In this case, the levels of the above-mentioned competency-based structures have been evaluated based on motivational, axiological, physical (sport, standard) and medical and valeological indicators.

The working definition of pedagogical conditions for forming technical students' competency in health promotion using physical education in the framework of this research is as broad as possible. It is a set of pedagogical and extracurricular factors influencing (constructively or destructively) the achievement of the set educational goal in the framework of the course on physical education.

The first pedagogical condition (optimizing organizational and interactive educational activities of students during physical education classes) aimed to replace the traditional kinetic approach to the course on physical education and prioritize personal, organizational, educational and axiological components. Moreover, physical education classes were planned in the ratio of lectures (20% of study time) and practical classes (80% of study time). The content of the course on physical education is a significant optional component, whereas the obligatory component has been modified by both teachers and students.

Also, the optimization of organizational and interactive educational activities was focused on the minimization of destructive factors, and the educational goal was implemented from stereotypical and spontaneous to the predictive, active, activity-based, meaningful, responsible, persistent,

cognitive, creative, optimistic and reflective acquisition of competency in health promotion. Interactivity has been a cross-cutting way of involvement, ranging from performing problem-oriented tasks and exercises in pairs to project- and goal-oriented interaction.

According to the research hypothesis, *the second pedagogical condition* (promoting independent forms of educational physical activities) should contribute to realizing the need to form the so-called "self-image", which contains the initial physical, somatic, aesthetic, psychological reflective views of the student about himself/herself. Accordingly, physical and valeological self-development acts as the "realization of oneself". The student, naturally, seeks development, therefore self-organizes the activity, control and psychophysical self-regulation. The stimulation of independent and self-initiated forms of educational activities was aimed at performing independent physical activities for self-preservation and health promotion. In this case, the operational and technological optimization of independent work will imply the flexibility of the educational process, which involves the differentiation and individualization of the content of the course on physical education. Initially, these aspects are organized by the teacher. Afterwards, they should be self-organized and supported by the student.

The third pedagogical condition (adjusting the content of the course on physical education taking into account the specifics of professional activities of technical students) is caused by several destructive factors, with which technical students deal during professional training, industrial placements and, finally, professional activities. On the other hand, the experimental content of the course on physical education has taken into account the positive factors in the influence of professional training on students' health (a professional interest in the material side of being and its improvement, energy transformation; the understanding of the laws of motion, mechanics and dynamics; culture and sport). In the context of professional needs, the content of training was enriched with the information necessary for forming the following partial competences: a) developing self-regulatory skills; b) developing personal relaxation techniques; c) shaping an instinctual need for periodic change of body position, self-organization of physical minutes; d) mastering the skills of minimal medical and physical self-help (self-massage of the lumbar and cervical spine, etc.).

Therefore, the modelling of pedagogical conditions for forming competency in health promotion using physical education can have several aspects: an hierarchical modelling of activities and activity of participants ("model → components of health promotion → pedagogical conditions + resources → forms of educational activities → pedagogical technologies –

pedagogical techniques (exercises, games, movements, etc.) → "professional self-image"); a structural model of pedagogical conditions, which determines the influence of specially created and background pedagogical conditions. In both cases, the student is the central component of modelling the system for forming students' competency in health promotion using physical education, and, more precisely, the image of oneself, which serves as the main motivational and resource source of physical and spiritual self-development.

The holistic model for forming competency in health promotion is designed to reflect the complete idea of realizing pedagogical conditions for forming competency in health promotion in technical students using physical education (see Figure 1). It has a hierarchical structure ranging from the organization of the educational process to the positive dynamics of forming competency in health promotion due to the system of pedagogical conditions. They are formed as a result of the analysis of several components, namely, scientific and methodological literature, practical experience of teaching the course on physical education, physical and valeological initial data and specifics of training and production activities of technical students, as well as motivational, axiological, cognitive and emotional components. The structural model is explicated in a methodological context. In the framework of the educational process, the acquisition of competency in health promotion acts as a pedagogical goal formulated on the basis of not only educational and didactic goals but also the requirements of the labour market for future technical specialists and personal motives clarified by the teacher and the student himself/herself during the first stages of the experiment.

The experimental work aimed to verify the effectiveness of the implemented pedagogical conditions and models for forming competency in health promotion in technical students using physical education.

The research was conducted at Vinnytsia National Technical University, Izmail State University of Humanities, Sumy National Agrarian University, Sumy Makarenko State Pedagogical University, Lviv State University of Physical Culture, Rivne Regional Institute of Postgraduate Pedagogical Education, Central Ukrainian Volodymyr Vynnychenko State Pedagogical University, Zakarpattia Institute of Postgraduate Pedagogical Education, Mariupol State University. The experiment involved 478 students (Years 1-4) and 19 physical education teachers from these HEIs. The students were divided into two groups: 241 individuals in the EG and 237 individuals in the CG. The respondents are aged between 17 and 25. The gender aspect has not been taken into account.

For two years (from Year 1 to 3) in EG, teaching and educational methods were applied; pedagogical conditions were created in accordance with the author's model for developing competency in health promotion in technical students by means of physical education. In CG, traditional classes were conducted; the development of competency in health promotion in technical students by means of physical education was not included in the educational process.

The process of conducting this research has taken into account relevant ethical rules. First, all ethical requirements were considered before the implementation of this research. Next, the authors obtained approval from the ethical committee of the university. Then, the respondents were informed about the goals and objectives of the research and were interviewed. Most importantly, they were assured that the participation in the research was voluntary, and they were entitled to leave it at any time.

Research methods include theoretical analysis of scientific literature; surveys (questionnaires; interviews); pedagogical observations; ascertaining and formative pedagogical experiment; pedagogical tests; methods of mathematical statistics. At all the stages of the experiment, the following analytical methods were used: justification, analogy, systematization, classification, generalization, forecasting and modelling.

Self-knowledge quizzes, mini-questionnaires and discussions on the relationship between responsibility for health, competency in this field and moral qualities were used to help student realize their attitude towards physical education. Besides, CG and EG students needed to complete the author's questionnaire so that the experimenters could check their initial levels of competency in health promotion. This questionnaire included 6 methods for assessment and self-assessment of the subjective level of development of competency in health promotion in technical students by means of physical education.

Also, other relevant tests helped to identify students' level of competency in health promotion. The Ruffier test was used to assess the level of functional fitness. The following exercises were used to assess general physical fitness: the Cooper test, the 100 metres; pull-ups (male students) and push-ups (female students); press-ups; shuttle run 4x9 m. During methodical-and-practical training, students were offered to check their values-based orientations by M. Rokeach. Methods of mathematical statistics were used to prove the effectiveness of pedagogical actions, basic links and relationships in this phenomenon. The significance of differences in the indicators of groups under study was identified using the Student's t-

test. Methods of test performance and their interpretations are presented in the papers by T. Krutsevych, M. Vorobiov, & H. Bezverkhnia (2010).

At the first stage (some preliminary diagnostics in 2016), surveys, tests, oral interviews, interviews, pedagogical observations helped to determine and analyze the existing subjective levels (low, insufficient, sufficient, high) of competency in health promotion in technical students using physical education, as well as functional and physical fitness. At this stage, the EG and the CG were formed.

At the second stage (the ascertaining experiment in 2017), the content and specific technological support of the educational process were developed following the author's programme based on state standards, taking into account the level of competency in health promotion in technical students by means of physical education, available finances and conditions of the educational process. At this stage, organizational and administrative factors were optimized (the syllabus included the required number of lectures, methodological and practical classes and provided sufficient informational, methodological and technological equipment of the educational process, as well as the availability of additional independent classes in gyms).

At the third stage (the formative experiment in 2018), specific attention was paid to the employment of the developed technology, the creation of pedagogical conditions for forming motivational, conceptual, cognitive, operational, emotional, volitional and practical components of competency in health promotion in technical students using physical education in the EG on the basis of individual criteria and indicators. The situations of pedagogical interaction took into account the objective organizational and activity-based relationships between the participants in the educational process. During this stage, the changes in the formation of competency in health promotion in technical students using physical education were determined, and the difficulties originating during this process were identified. Various forms of educational work (questionnaires, essay preparation, summaries, reports, presentations, discussions, games, tests on physical and functional fitness, understanding check, etc.) were used to help students to comprehend their attitude and the attitude of others towards forming competency in health promotion, to strive for self-study, self-education, etc. The formative evaluation was inextricably related to planning students' classwork and independent work and played an important role in ensuring the axiological, conceptual and competency-based focus of training. Its content, methods and techniques of pedagogical influence were adjusted depending on the effectiveness of the educational process.

At the fourth stage (the monitoring experiment in 2019), the results obtained in the EG and CG were analyzed and compared based on students' self-evaluation, pedagogical and expert evaluation of the level of competency in health promotion in technical students using physical education, physical and functional preparedness.

According to the author's programme, the specific content and technological support of the educational process were designed taking into account the subjective level of competency in health promotion in technical students using physical education in the EG on a commercial basis, as well as the optimization of pedagogical conditions for implementing the educational process. The formative stage was aimed at applying the designed technology and creating pedagogical conditions for forming competency in health promotion in technical students using physical education in the EG based on selected criteria and indicators. The situations of pedagogical interaction were built following the objective organizational and activity-based relationships between the participants in the educational process. At the monitoring stage, the results obtained in the EG and CG were analyzed and compared.

Results

The experimental work confirms the effectiveness of the designed methodology, which has made it possible to create the qualitatively new conditions of educational activities in the educational process of physical education, to form competency in health promotion in technical students using physical education aimed at developing and realizing the values in this field. The EG students have reached a higher level of subjectivity, physical and functional fitness. Thus, the values of physical education have become an essential component of their life and the basis of professional and personal development. At the end of the experiment, most respondents (80 %) in the EG have reached a high level of competency in health promotion using physical education. In the CG, the differences in levels have not shown any significant changes since only 32.5% of respondents have a high level. In general, the effectiveness of the educational process in the EG was characterized as sufficient in the EG and insufficient in the CG.

Table 1 shows the final results obtained at the beginning of the ascertaining experiment and after the formative stage of the experiment in the EG regarding the changes in the level of competency in health promotion in technical students using physical education.

Table 1. *The levels of competency in health promotion in technical students using physical education during the experiment (%)*
Source: developed by the authors' conception

Types	Before the experiment				After the experiment				Increase			
	EG		CG		EG		CG		EG		CG	
	Abstract number	% of the total number	Abstract number	% of the total number	Abstract number	% of the total number	Abstract number	% of the total number	Abstract number	% of the total number	Abstract number	% of the total number
High	6	2.4	6	2.5	19	7.9	6	2.5	13	5.5	0	0.0
Sufficient	67	28.0	62	26.2	173	71.8	74	31.2	106	43.8	12	5
Insufficient	156	64.7	163	68.8	49	20.3	154	65.0	-107	-44.4	-9	-3.8
Low	12	4.9	6	2.5	0	0.0	3	1.3	-12	-4.9	-3	-1.2

The factual material of the experimental work proves the acquisition of competency in health promotion by technical students using physical education since the systematic use of its techniques in daily living activities contributes to a significant increase in physical and functional fitness and helps to improve health.

The use of the designed model and the formulated pedagogical conditions for forming competency in health promotion in technical students using physical education provides an opportunity to develop their competency more effectively. This assumption has been experimentally verified.

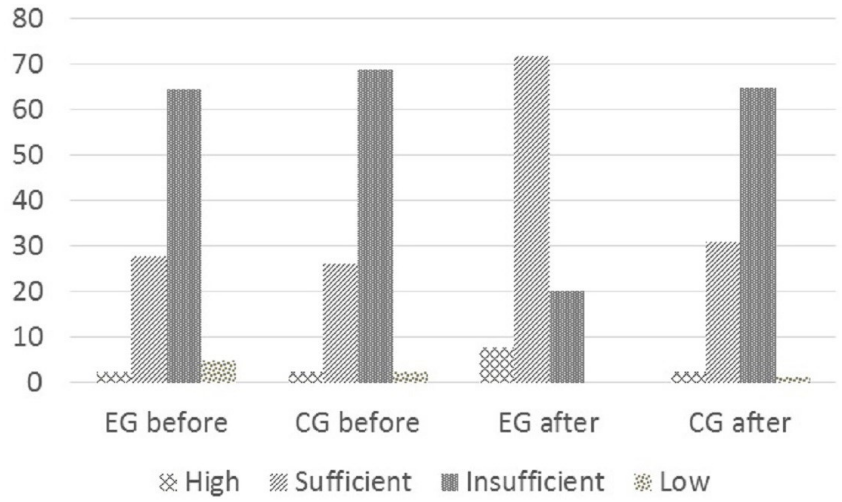

Fig. 2. *The dynamics of acquiring competency in health promotion by technical students using physical education*

Source: developed by the authors' conception

Discussion

The scientific value and theoretical significance of the obtained results lie in the fact that, ***for the first time***:

– the effectiveness of implementation of pedagogical conditions and model for developing competency in health promotion by means of physical education in technical students has been *justified*;

– the principles, structure and content of implementation of certain methods, technologies, techniques and ways of developing competency in health promotion in technical students have been *determined*; the correlation between the specificity of training and production activity of technical students and the dynamics of their health has been *established*; a set of didactic and educational measures to minimize destructive professional factors has been defined;

– the content, forms and methods of teaching an elective course on physical education, ways of developing personal motivation, acquiring relevant competencies, cultivating professional "self-image" in future engineers, designers, programmers by means of physical education have been *improved*;

– a) the theory of personality-cantered approach; b) approaches to building practical models of health promotion; c) the idea of adjusting the

content of the course on physical education to the subject-specific area of the educational process have been further developed.

The practical value of the obtained results consists of developing and implementing the content-related and methodological support, pedagogical conditions and their practical application, as well as the ways of identifying the level of competency in health promotion in technical students in the educational process of technical universities. Practical results of the research can be used in the development and implementation of teaching and methodological recommendations for the elective course on physical education in technical, economic, aviation, mechanical engineering and other universities.

According to the classical philosophy of Hegel (1977), the pragmatist and, at the same time, axiological structures of personality during the studenthood develop following the same points but at a higher level. However, their reduction is impossible without reaching the previous level. Therefore, pedagogical conditions for forming students' competency in health promotion using physical education are based on classical approaches to a common understanding of the educational environment and its static and dynamic characteristics.

The conducted research confirms the theory of Yu. Gushcho (1993), who once distinguished six minimum conditions (not educational but vital) which enable the normal and progressive functioning of the human body: clean air, proper use of water (consumption and contact), healthy nutrition, provision of motor needs, as well as the availability of life goals and the ability to prevent and cleanse the body.

Given that the systematic, appropriate and motivated exercise and physical activity are impossible without some internal organization, it is important to distinguish the so-called internal educational conditions of health promotion. Considering the student's personality in the context of its formation and education using physical education, it must be noted that this process consists of stable objective and subjective social qualities arising and developing during educational activities, as well as under the influence of social environment. The dynamics of students' interests, motives and interests in physical education during their higher education study shows that there are no significant changes in their understanding of the importance of maintaining a healthy lifestyle, labour and professional activities. Therefore, future specialists will decrease their physical activity after obtaining credit or graduating from HEIs (Ovcharuk, 2011, 2014; Voronin, 2006).

The conducted research does not disclose all aspects of the problem under study. The following areas of future research are considered as promising: improving the educational and methodological support of forming competency in health promotion; searching for motivational resources to promote the values of healthy lifestyles in society; developing theoretical and practical principles of organizing independent work on the formation of health promotion for students in general taking into account the future area of their professional activities and health.

Conclusions

A scientific analysis of creating a health-promoting environment in higher education has recently come to the fore among pedagogical problems and has acquired an interdisciplinary status. This is facilitated, on the one hand, by close attention to current human, legal, social and scientific issues, and, on the other hand, by the emergence of a new digital and informative, rapidly changing, unsustainable environment. Currently, researchers are facing new anthropological problems that can no longer be solved within the individual sciences (medicine, ecology, psychology, hygiene).

Health promotion of the younger generation is becoming relevant and a key task of education, especially higher education, where the final socialization and self-determination of the individual takes place. It is clear that educators see the basis of health promotion and rehabilitation of students in the development of theoretical and practical health-promoting competencies, which is most effective in the mode of optimal motor activity.

According to physiologists, educators and doctors, physical education is the most ancient, natural and deeply motivated field of human activity, which gives it an undeniable advantage in shaping the needs, knowledge and skills of health promotion. Reforms in physical education towards personality-oriented synergetic and humanistic paradigm allows creating optimal educational conditions for developing competency in health promotion, sufficient for life and labour engineering and technical activity. It is a competency-based approach which fully develops physical, psychological and valeological culture.

The definitive analysis, the essence and the content characteristics of the main key concepts that allow one to study the development of competency in health promotion in technical students by means of physical education are grouped within the explication of key meta-categories (*physical activity – competency – health*), which include such specific concepts as health, motor activity, health-promoting environment, health-promoting

technologies, motivation and values, valeological culture, educational space, subject-object and subject-subject interaction, self-organization, dynamics.

The obtained findings show that the justified pedagogical conditions and the proposed methodology of their realization and diagnostics in the process of forming competency in health promotion in technical students using physical education has made it possible to create qualitatively new conditions for educational activities in the educational process of physical education, to form competency in health promotion in technical students and has improved the quality of training and focus on the development and implementation of health promotion values .

In the framework of the research, all indicators of competency in health promotion in future specialists in the EG are higher than those in the CG, which proves positive qualitative changes in the formation of competency in health promotion using physical education. This confirms the research hypothesis and indicates the achievement of research objectives and goals.

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