

ORIGINAL SCIENTIFIC PAPER

Formation of Health and Fitness Competencies of Students in the Process of Physical Education

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Abstract

The technology of forming the health and fitness competencies of students of higher educational institutions is reviewed in the present paper, which includes designing the highly efficient educational activity of students and the management activity of a teacher with the principal orientation to the content and forms of the educational process in the personal-development technologies of training. The study aims to substantiate, implement, and verify the efficiency of the original methodical system of physical education of students of Ukrainian higher educational institutions. A total of 87 students, aged 18–22, including 46 males and 41 females, participated in the study. The research methods were conceptual-comparative analysis, questionnaires and surveys, pedagogical observations, expert assessments, testing, pedagogical experiment, and statistical methods. It has been determined that the original methodical system, implemented in the educational process of physical education, contributes to improving the quality of the physical education of students, forming highly-developed health and fitness competencies that are required during professional activity to maintain a high level of physical fitness and working capacity.

Keywords: *physical education, methodical system, health and fitness competencies, students*

Introduction

The efficiency of the system of physical education of students of higher education institutions is determined by the adequate choice of the purpose and tasks, organizational forms, methods, and means of teaching, health promotion, and education in rational combination (Azhyppo et al., 2018; Mozolev, Halus, Bloschynskyi, & Kovalchuk, 2019). The orientation towards the innovative technologies of physical education of students leads to significant changes in its content and procedural components, determines the modernization of the traditional physical education system, as well as the development of a

new methodical system that is the theoretical and methodical foundation of the educational process. The physical education functions often are aimed at providing services that have the purpose of good leisure time, ensuring a healthy lifestyle; they thus have a social dimension (L. Shuba, & V. Shuba, 2017; O. Zavydivska, N. Zavydivska, & Khanikiants, 2016).

Physical education classes are a complex pedagogical entity in which the didactic and organizational-methodical processes are universally linked to the patterns of muscular performance and the analytic-synthetic function of the brain (Bliznevsky et al., 2016; Bosenco, Samokih, Strashko, Orlik, & Petrovsky,



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2013; Prysiazhniuk et al., 2018). Without concerning this relationship, the efficient solving of educational, pedagogical, and wellness problems can be quite complicated when forming students' readiness for future professional activity. An efficient system of physical education must meet the following requirements: a) to ensure purposeful motor activity of all segments of the population and, on this basis, to promote the increase of physical fitness, health improvement, and the prevention of diseases; b) to guarantee the accessibility and quality of motor health services; c) to carry out the formation of the necessary human, financial, material, and technical resources and their rational use (Rus 2017; Prontenko et al., 2019; O. Kharchenko, N. Kharchenko, & Shaparenko, 2019; Melnyk, 2019).

The traditional system of physical education of the students of higher education institutions is characterized by: a) no specific social order of production and employers for the physical readiness of graduates and, as a result, a lack of understanding of the necessity of physical education by the directors and students of higher education institutions; b) insufficient humanistic and professional orientation of the physical education process, inefficient management of this process; c) ineffective theoretical and methodological training of students concerning personal physical culture; d) a limited range of practical and activity components that ensure the totality of physical culture functions; e) a low efficiency of didactic filling of the practical sections of the programme of physical education; f) the inadequacy of the organization forms of physical education process for the present-day mentality and motivational maturity of students; g) the lack of the students' motivation for their own physical education and its improvement (Mozolev et al., 2019; Griban et al., 2018). All of these factors determine the relevance of our research.

The research aims to substantiate, implement, and verify the efficiency of the original methodical system of physical education of students of Ukrainian higher educational institutions.

Methods

The pedagogical experiment was conducted at Zhytomyr National Agroecological University; 87 students, including 46 males and 41 females, of the faculties of veterinary medicine, ecology and law, engineering and energy, accountancy and finance participated in it. They were divided into control (CG) and experimental (EG) groups by the method of the even distribution of groups. Thus, the experimental group included 44 students (24 males, 20 females); the control group included 43 students (22 males, 21 females). Physical education classes in all groups were held twice a week in the first half of the day. The purpose of the experiment was to substantiate and introduce a methodical system of physical education to the educational process of the experimental group students. The control group students studied according to the curriculum for higher education institutions. Control tests were conducted at the end of the first term (December) and at the end of the academic year (May-June) during two years of study.

The efficiency of the functioning of the methodical system of physical education, in addition to mastering the general tasks of physical education, was considered to be the students' health and fitness competencies as some internal, potential, latent psychological indicators: knowledge, motives, preferences, interests, skills, programmes of actions, systems of values, attitudes to physical and health-improving activity, which are

manifested in the methodical competence to introduce and transfer them to other members of society, in particular in the process of professional activity.

The criteria of the readiness of future specialists to use and implement the means of physical education in the further life after graduation were the motivational, cognitive, and activity components. All criteria were rated as high, sufficient, middle, and low, with regards to the levels of expression.

A high level of readiness implies a student's developed system of skills and abilities, the ability to select the methods and means of physical education appropriately. A student actively uses the acquired knowledge and skills in everyday life, has a strong interest in physical, wellness and sports activities expressed, is systematically engaged in physical culture and sports, takes an active part in organizing and conducting competitions, and is able to choose the methods and means of physical education to implement in life.

A sufficient level is achieved when a student has a formed system of knowledge, skills, and abilities, masters a complex of methods, makes the full use of the means of physical education. A student with this level of readiness uses knowledge and skills in everyday life, has a steady interest in physical and fitness activities, is engaged in systematic physical activity and sports, is aware of the need to improve one's sportsmanship, does not require external stimulation, and is ready to introduce the developed knowledge and skills in professional activity.

A middle level is achieved when certain abilities and skills in physical and wellness activity are formed, but they are not systematic. A student with such a level has a steady interest in the use of acquired knowledge, abilities and skills in physical and fitness activities, is systematically engaged in physical culture or sports, and has an interest in improving his/her sportsmanship.

A low level implies the certain skills and abilities of a student are formed; he/she has individual methods but does not fully use the means of physical education. A student is characterized by fragmentary ideas in the field of theory and practice of physical education, requires external stimulation of activity for self-education, is not systematically engaged in physical exercises and sports, is not interested in physical culture and sports, and only occasionally uses the means of physical education.

A motivational criterion of the students' readiness for physical and wellness activity is defined as a system of conscious and personally acquired needs and motives for a healthy lifestyle, the improvement of life activity based on self-realization in the field of physical culture and sports that allows realizing an individual programme of self-development and self-education with regards to an objectively created programme of professional and personal development. A cognitive criterion of the readiness for health and fitness activity is defined as a system of mastering knowledge of the theory and methodology of physical education, the practice of organizing and conducting sports and wellness events, the result of which is knowledge, abilities, and skills. An activity criterion of students' readiness for fitness and health-promoting activity is a complex of personally acquired ways to form an individual range of motor skills necessary in life and to teach to apply the acquired knowledge and skills in everyday life and in professional activity.

The following methods of investigation were used: conceptual-comparative analysis, structural and system analysis, modelling, questionnaire, and survey analysis, pedagogical observations, expert assessments, testing, self-assessment, pedagogical experiment, and mathematical statistics. When

the research was conducted, the reliability of the difference between the indicators of students was determined by means of a student's t-test. The significance for all statistical tests was set at $p < 0.05$.

This study complies with the ethical standards of the Act of Ukraine "On Higher Education" No. 1556-VII dated 01.07.2014 and the Letter from the Ministry of Education and Science of Ukraine "On Academic Plagiarism Prevention" No. 1/11-8681 dated 15.08.2018, and also the principles of the Helsinki Declaration of the World Medical Association regarding ethical principles for medical research involving human subjects. Informed consent has been obtained from all individuals included in this study.

Results

Based on many years of research and taking into account the results of the works of many scientists, we substantiated the original experimental methodical system of physical education, which is considered as an ordered set of interrelated and interdependent methods aimed at the formation of health and fitness competencies in the process of physical education.

The methodical system aims to provide a sufficient educational level, the necessary motivational value-based attitude to physical culture and a healthy lifestyle, harmonious development of the body, high physical performance, and a stable need for physical improvement in the further life after graduation. The implementation of the original methodical system involves three stages.

At the first stage (adaptive), the solution of the following fundamental pedagogical tasks is ensured: a) the adaptation to the educational process (intensive mental activity) at the higher educational institutions by means of physical education; b) the education of the students' stable interest, motives, positive attitude, and need for physical activity; c) an increase of the general level of physical fitness, the development of physical abilities, reserve functional capabilities of a human body, health improvement, the promotion of inclusive development; d) the formation of knowledge on following a healthy lifestyle and engaging in independent exercise, conducting active leisure.

At the second stage (the achieving of comprehensive development), the following pedagogical tasks are achieved: a) the use of different forms of physical education and mastering wellness fitness technologies; b) the formation of psychophysical qualities and readiness for viability.

At the third stage (the formation of the need for a healthy lifestyle), the following pedagogical tasks are achieved: a) harmonious development of an organism and a significant increase in physical performance; b) the education of a students' stable need for physical self-improvement, self-knowledge,

and self-esteem; c) gaining experience in the use of fitness and health activities to achieve professional and life skills; d) mastering the methodology of organizing and conducting sports and health-promoting events in the society.

The introduction of the methodical system into the process of physical education significantly influenced the overall level of formation of the motivational component in the experimental group, which was significantly increased, in comparison to the training according to the traditional system. Thus, a high level of motivational component formation accounted for 20.5%, sufficient 34.1%, middle 31.8% and low only 13.6% in the EG (Table 1). Concerning the CG, 4.6% of students were observed to have a high level of formation, 16.3% sufficient, 37.2% middle and 41.9% low.

The monitoring in the cognitive direction during training according to the original methodical system of physical education revealed the positive dynamics of the acquired knowledge and skills necessary for the organization of physical health-improving and sports-mass activities after graduation. The indicators of the level of knowledge and skills are a) the general theory and methodology of physical health education; b) the organization and conducting sports competitions and physical health-improving events; c) competition judging; d) the creation of a complex of sports facilities and equipment for physical education classes and its material and technical supply. Thus, a high level of knowledge and skills accounted for 18.2% in the EG, and 2.4% in the CG. A sufficient level of acquired knowledge and skills accounted for 29.6% in the EG, and 13.9% in the CG. A middle level of knowledge and skills was also better in the EG 38.6%; it accounted for 34.9% in the CG. A large difference was observed in the indicators of a low level, which were 13.6% in the EG and 48.8% in the CG.

The results of the study by activity component showed the improvement of the results in the EG concerning the level of mastering special knowledge, skills, and abilities to control physical fitness and health status, to properly apply the means and methods of physical education in practice for the development of physical qualities during life, to plan physical health-improving and sports process in the further life. At the same time, 22.7% EG students and only 9.3% of CG students showed a high level of readiness to introduce the means of physical culture and sports during their professional activity and life. Concerning a sufficient level of knowledge and skills, the EG students' results also prevailed: the indicators accounted for 34.1% in the EG and 16.3% in the CG. A middle level accounted for 36.4% in the EG and 37.2% in the CG. A low level in the EG and CG accounted for 6.8% and 37.2%, respectively, which indicates the high efficiency of the implementation of the original methodical system of physical education (Table 1).

Table 1. The level of health and fitness competencies of students after the pedagogical experiment (EG=44; CG=43)

The criteria for evaluation	Groups	The level of health and fitness competencies			
		High (%)	Sufficient (%)	Middle (%)	Low (%)
Motivational	EG	20.5	34.1	31.8	13.6
	CG	4.6	16.3	37.2	41.9
Cognitive	EG	18.2	29.6	38.6	13.6
	CG	2.4	13.9	34.9	48.8
Activity	EG	22.7	34.1	36.4	6.8
	CG	9.3	16.3	37.2	37.2

The methodical system also helps to determine the requirements for the training of a specialist according to the criteria of organizational, communicative, perceptive, speaking, didactic abilities and inclinations for physical health-promoting and sports activities, creativity, general cultural level, social activity, and self-esteem. The basic requirements for the development of fitness and health competencies influence the formation of the content of the main components of the methodical system of physical education.

The studies also confirmed that theoretical knowledge is the basis for activating students' consciousness, and they de-

termine the level of the needs for physical and wellness activities. The conducted pedagogical experiment showed that the initial level of theoretical knowledge concerning all studied parameters is quite low (1.84–2.15 points) in both the EG and CG, and it is rated as unsatisfactory. The methodical system introduced in the process of physical education of the EG students significantly improved all comparative indicators in the EG – 2.06, and 2.44 points ($p < 0.001$). The analysis of the results in the CG showed that the improvement of the indicators was lower, and it occurred only because of the low initial points (Table 2).

Table 2. The dynamics of theoretical knowledge during the period of the pedagogical experiment

The indicators estimated	Groups	Before the experiment	After the experiment	The difference	The reliability of the difference	
		Mean±SD (points)	Mean±SD (points)		t	p
General basics of physical culture	EG	2.11±0.27	4.17±0.32	2.06	4.92	<0.001
	CG	2.15±0.26	3.24±0.30	1.09	2.75	<0.01
Special knowledge, skills, and abilities to apply them	EG	1.84±0.23	4.28±0.31	2.44	6.32	<0.001
	CG	1.91±0.21	2.77±0.27	0.86	2.51	<0.05

Legend: Mean-arithmetical average; SD-standard deviation; t-test; p-significance of difference of testing indicators before and after the experiment due to the t-test.

It can be stated that the methodical system of physical education significantly improves the level of theoretical training of students in the discipline of Physical Education, which positively influences the level of formation of health and fitness competencies of students. The acquired knowledge will allow the EG students to easily orient towards the issues of physical culture and be able to apply them during independent classes and the organization of a healthy life-

style.

The analysis of the indicators of physical fitness of students, obtained in the process of the pedagogical experiment, convincingly showed the high efficiency of the implementation of the original methodical system in the process of physical education. The EG students significantly improved their performance in all six tests that were used to assess the level of physical fitness (Table 3).

Table 3. The dynamics of the indicators of physical fitness of male students during the pedagogical experiment

Tests	Groups	Before the experiment	After the experiment	The difference	The reliability of the difference	
		Mean±SD	Mean±SD		t	p
The 100 m race (s)	EG	14.41±0.24	13.52±0.18	0.89	2.97	<0.01
	CG	14.39±0.22	14.18±0.19	0.21	0.72	>0.05
The 3000 m race (min, s)	EG	14.21.7±0.29	13.11.3±0.22	1.10	3.02	<0.01
	CG	14.32.4±0.31	14.03.9±0.28	0.28	0.69	>0.05
Pull-ups (reps)	EG	7.06±0.65	11.83±0.49	4.77	5.86	<0.001
	CG	7.38±0.59	8.64±0.54	1.26	1.58	>0.05
Push-ups (reps)	EG	28.54±2.13	37.28±1.96	8.74	3.02	<0.01
	CG	28.02±2.17	32.41±2.25	4.39	1.40	<0.05
Standing long jump (cm)	EG	213.67±2.51	236.78±2.48	23.11	6.55	<0.001
	CG	211.44±2.47	217.39±2.38	5.95	1.73	>0.05
Sit-ups (reps)	EG	27.53±2.09	39.61±2.01	12.08	4.15	<0.001
	CG	28.13±1.93	33.56±1.85	5.43	2.03	<0.05

The EG male students showed the best indicators of physical fitness at the end of the experiment in the 3000 m race ($p < 0.01$), pull-ups ($p < 0.001$), push-ups ($p < 0.001$), sit-ups ($p < 0.01$), and other exercises. At the same time, the results of the CG male students were significantly improved only in push-ups and sit-ups ($p < 0.05$), which indicates that the traditional physical education system is not able to provide the required level of physical fitness of students during their studies.

The EG female students also significantly improved the performance of all tests. The best results were achieved in standing long jump, angled position, push-ups, sit-ups ($p < 0.001$) and other tests ($p < 0.05$). In the CG, female students showed a significant improvement of the results in only two tests: push-ups and sit-ups ($p < 0.05$) (Table 4).

A low level of physical fitness of female students is accompanied by uncertainty in their actions, depression, discomfort,

Table 4. The dynamics of the indicators of physical fitness of female students during the pedagogical experiment

Tests	Groups	Before the experiment	After the experiment	The difference	The reliability of the difference	
		Mean±SD	Mean±SD		t	p
The 100 m race (s)	EG	18.06±0.21	17.04±0.23	1.02	3.28	<0.01
	CG	18.17±0.26	17.94±0.28	0.23	0.60	>0.05
The 2000 m race (min, s)	EG	11.54.9±0.27	10.46.3±0.29	1.08.6	2.73	<0.01
	CG	11.36.8±0.30	11.21.4±0.32	15.4	0.34	>0.05
Push-ups (reps)	EG	8.97±0.98	15.36±1.03	6.39	4.49	<0.001
	CG	8.24±0.83	11.46±0.92	3.22	2.60	<0.05
Standing long jump (cm)	EG	161.86±2.34	175.53±2.41	13.67	4.07	<0.001
	CG	163.35±2.42	168.74±2.38	5.39	1.59	>0.05
Sit-ups (reps)	EG	27.14±1.71	38.29±1.92	11.15	4.34	<0.001
	CG	28.03±1.82	33.68±1.83	5.65	2.19	<0.05
Angled position (cm)	EG	10.92±0.98	17.63±1.12	6.71	4.51	<0.001
	CG	11.10±1.02	13.59±1.15	2.49	1.62	>0.05

and deterioration of recovery processes during physical and mental activity that, in general, negatively influences the formation of health and fitness competencies.

Discussion

The organizational and pedagogical basis of the model of the efficient physical education of students should be provided by the physical readiness of the graduates of higher educational institutions for productive work and active life, that is a) theoretical, methodical and practical training, based on educational and extracurricular activities of the generally-conditioned and vocationally-applied psychophysiological and psychophysical improvement, sports training, physical rehabilitation, physical exercises in the regime of the day; b) didactic, which mainly involves the use of the physical education means and methods and physical exercise systems, traditionally popular among students: athletics, gymnastics, swimming, sports games, power sports, fitness technologies, etc.; c) the use of the socially efficient set of methods of the students' motivation for physical education: semester credit, the screening for prestigious job taking into account the level of physical fitness, promotion of physical improvement, regular diagnostics of physical condition, annual state testing of physical fitness, current and final certification after graduation (Bergier et al., 2017; Mehmeti, & Halila, 2018; Ostafijchuk, Prezliata, &

Mytskan, 2013; Altin, & Demir, 2019; Batilani, Belem, & Both, 2018; Leuciuc, 2018; Bolotin, & Bakayev, 2015).

The original methodical system of physical education includes a) a holistic reflection of the tasks of forming a comprehensively developed personality of a future specialist in the content of teaching; b) a high scientific, methodical and practical level of the content of the training classes; c) the correspondence of the complexity of the content of educational process to the student's capabilities: health status, the level of physical development and physical fitness, abilities and technical skills in performing exercises; d) the correspondence of the educational material content volume to the time allowed for its mastering or implementation; e) the conformity in the content of educational material with the material and technical base of higher educational institutions and the specialists in this area.

The results of the pedagogical experiment show that the original methodical system of physical education contributes to the improvement of the quality of physical education, which is revealed in the improvement of the motivational value-based attitude of students to physical and wellness activities, theoretical knowledge, physical fitness, the development of physical qualities, and in the complexity of the formed health and fitness competencies required in professional activity.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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