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**Original Article**

# Peculiarities of application of interactive educational technologies in training of future teachers of physical culture to work with health protection in secondary school

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**Abstract:**
The article deals with the issue of search and implementation of the most effective conditions, methods, and educational organization forms into training of future teachers of physical culture to work with health protection in secondary school. The following methods of research have been used: analysis of scientific and methodological references, questioning, pedagogical experiment, methods of mathematical statistics. Teachers (n = 96) and students (n = 131) from leading higher educational establishments of Ukraine that train future teachers of physical culture took part in the research. At the first stage of research, organizational and methodological aspects of implementation of interactive educational technologies into educational process of training of future teachers of physical culture have been substantiated. At the second stage of research, present-day state of implementation of interactive educational technologies into educational process of training of future teachers of physical culture to work with health protection in secondary school has been analyzed. The third stage of was dedicated to experimental substantiation of the efficiency of application of interactive educational technologies into training of future teachers of physical culture. As a result of research, organizational and methodological peculiarities of application of such interactive methods of education as lecture-provocation, lecture-conference, binary lecture, round table, debates, brainstorming, didactic games, case-studies, workshops, flash mob within the process of mastering professionally-oriented subjects by students who will major in "Physical education". It has been revealed that the major part of teachers do not use interactive educational technologies. The least popular among teacher are a lecture-conference, binary lectures, workshops, and flash mob. Application of interactive educational technologies within the training of future teachers of physical culture to work with health protection in secondary school allowed increase of the acquiring theoretical knowledge in professionally-oriented subjects.
**Key words:** interactive educational technologies, future teachers of physical culture, health-protection activity, secondary school.

## Introduction

Professional activity of teachers of physical culture depends on creative types of activity, complexity of which is stipulated by a big amount of components and variability of interrelations between them [Backman E., Larsson H.,.]. Effective realization of health-protection activity by participants of educational process is possible due to future teachers of physical culture having profound and comprehensive knowledge and skills in their critical; analysis; ability to apply theoretical and methodological statements in practical activity; ability to develop themselves, elaborate new methods, forms, means and ways; dialectical, variation, changeable system of activity; efficient use of available experience under new conditions; ability to do a reflexive evaluation of personal activity and its results, to form individual style of professional activity based on combination and operation of etalon and individual features; ability to improvise based on knowledge and intuition.

Analysis of modern practice of professional training of future teachers of physical culture shows insufficient level of students' development of the entire set of professionally-important abilities, which actualizes the issue of search and implementation of effective conditions, methods, and organizational forms of studies into the system of training.

Leading researchers and practitioners in the field of higher education of Ukraine, L. Sushchenko [Sushchenko L. P. (2003)], O. Tymoshenko [Tymoshenko O. V. (2009)], as well as foreign researchers [Ayvazo


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S., Hasan M., S. Bouzid Mohamed, Haweni Aymen, Fadhloun Mourad, Mrayeh Meher, Souissi Nizar. Formative Assessment: Exploring Tunisian Cooperative Teachers Practices in Physical Education, (2017), Muszkieta R., Napierała M., Cieślicka M., Zukow W., Kozina Z., Iermakov S., Górny M. The professional attitudes of teachers of physical education, (2019),] have focused on analysis of various aspects of professional training of teachers of physical culture.

Lai Hsiang-Ru, Wu Der-Min, Lee Pi-Hsia, Jhang Yu-Siang [8], F. Peterson, R. Cooper, J. Laird [Peterson F., Cooper R., Laird J.] note specific importance of formation of readiness of future teachers of physical culture for health-protection activity.

Results of research [Bazylchuk O., Putrov S., Bazylchuk V., Sushchenko L., Galina I., Danylevych M., Romanchuk O., Hrybovska I., Ivanochko V.] show that implementation of innovation educational technologies has a significant reserve regarding modernization of the system of higher physical education.

Application of interactive technologies promotes formation of skills in critical thinking, analytical abilities, independence, responsibility for decisions making, cognitive, creative, communicative, personal activity; develops thinking originality, ability to generate ideas, and provides positive dynamics in the development of professional competences. At present, basic theoretical and methodological peculiarities of application of such interactive educational technologies as interactive lectures [Figol N. A], brainstorming [Izmailova E., Kuznyetsova Yu. ], business games and role playing [Khazova S. A.], case-study [Pometun O.I.], group discussions, debates, trainings, interactive tours [Nikishin V., Tverdokhlebova M., Hontar E.] have been substantiated. However, we may assume that application of interactive educational technologies within the training of future teachers of physical culture to work with health protection in secondary school has not been sufficiently revealed in the works by native researchers.

**Material & methods**

At the first stage of research, organizational and methodological aspects of implementation of interactive educational technologies into educational process of training of future teachers of physical culture to work with health protection in secondary school have been substantiated.

The second stage of research has envisaged defining current state of implementation of interactive educational technologies into educational process of training of future teachers of physical culture to work with health protection in secondary school. To reach this goal, we have done polling, in which teachers (n = 96) from leading higher educational establishments of Ukraine that train future teachers of physical culture took part, namely: 10 teachers from Academy of recreational Technology and Law, 15 teachers from Berdyansk State Pedagogical University, 19 teachers from Lviv State University of Physical Culture, 19 teachers from Dragomanov National Pedagogical University, 15 teachers from Sumy State A.S. Makarenko Pedagogical University, and 18 teachers from The Bohdan Khmelnytsky National University of Cherkasy.

The third stage has been dedicated to experimental substantiation of the efficiency of interactive technologies application into the training of future teachers of physical culture to work with health protection in secondary school. Students from the following universities took part in the research: Lviv State University of Physical Culture (n=46), The Bohdan Khmelnytsky National University of Cherkasy (n=44), Dragomanov National Pedagogical University (n = 41). They constituted control and experimental groups and had the same level of preparedness. Overall number of students who took part in the formative experiment was 131 persons. In the control group, seminar classes were done by the classical scheme. During lectures, practical, and seminars, interactive educational technologies were implemented in the experimental group. Based on tests that included 181 questions, efficiency of learning program material has been defined and compared in the experimental group. During statistic processing of the research material, comparative analysis was used. With the help of "Excel" program, arithmetic mean ($\bar{x}$), quadratic deviation (S), average error (m), validity of differences by Student's t-criterion, p – the level of value, have been defined; graphic representation of the results of static analysis has been done.

The aim of the research is to experimentally substantiate efficiency of application of interactive educational technologies within the training of future teachers of physical culture to work with health protection in secondary school.

Objectives of the research:

1. Substantiation of organizational and methodological peculiarities of application of interactive educational technologies within educational process of training of future teachers of physical culture.
2. Analysis of present-day state of implementation of interactive educational technologies into the process of training of future teachers of physical culture to work with health protection in secondary school.
3. Verification of the efficiency of application of interactive educational technologies within the training of future teachers of physical culture to work with health protection in secondary school.

**Results**

Based on analysis of scientific and methodological references, we have defined the following interactive technologies for implementation into professional training of future teachers of physical education t

work with health protection in secondary school: interactive lectures, discussions, "brainstorming" method, didactic games, case-study, workshop, flash mob. Let's analyze in detail, using examples, organizational and methodological peculiarities of the realization of the aforementioned technologies within studies in professionally-oriented subjects for students of 0102 "Physical education, sports, and human health" subject area, 6.010101 "Physical education" major.

*Lecture-provocations* were using in "Theory and methods of physical education" and "Introduction to the specialty" classes when it was important to create a clear understanding of organization of the system of physical education in Ukraine. Search for errors in lecture content stimulated memory and concentration within the process of independent work with a textbook and lecture notes while preparing to practical classes.

*Lecture-conference* is done by the scheme similar to scientific conferences. According to the topic of the class, the teacher makes a list of questions that present a problem in general, prepares students beforehand, and familiarizes the students with regulations. As a rule, 5-10 minutes are given to give a report. After giving the report, the student answers the questions; material is being discusses and generalized. Such type of lectures was used in "Theory and methods of physical education" class, for instance, as the students had a chance to study the system of methods of physical education in practical classes during the first year of studies.

During the lecture in "School course of physical culture and methods of teaching", we tried a slightly different format of a lecture-conference. Having announced the topic, for instance "Physical education of school children", we asked students to formulate questions by the topic in writing and pass them to the teacher within 3-5 minutes. After the questions were logically grouped, the teacher would begin the lecture. Presentation of material did not lie in answering the questions, but in creation of a connected text that revealed the lecture content, in the process of which the teacher was drawing attention to the most content-relevant questions of students.

In the end of the lecture students expressed their opinion on whether they had received answers on all question. The teacher, in his turn, evaluated all questions. Quality of students' questions showed the level of their knowledge, level of their interest in the issue, and level of readiness to cooperate with the teacher.

*Lecture-visualization* allows formation of professional motivation; promotes development of skills in visual perception, processing, analysis, and synthesis of the obtained information; provides subject-subject interaction between a teacher and a student, development of creative activity and cognitive independence, special and subject competences of future teachers of physical education. When training future teachers of physical culture to work with health protection in secondary school, during a lecture-visualization, we demonstrated normative documents that define the place of physical education in the system of secondary education, structurally-logical schemes of physical education management in secondary schools in Ukraine, its aim, objectives, principles, schemes of physical education management in secondary schools; using examples we familiarized the students with new health-protection technologies that are used in comprehensive schools; we showed videos of physical culture lessons and such types of physical and health-protection work with students pre-class gymnastics, physical-culture minutes during classes, hours of physical culture during after-school activities, games during breaks, games and entertainment during walks; slides that shoed various ways of organization of educational work during classes of physical culture etc.

The method of binary lecture was tried in "School course of physical culture and methods of teaching" class. A primary teacher was teacher-theorist, whose task was to show the meaning and tasks of physical education of school children, basic terms framework, mechanism influence of physical exercises on human body; to characterize morphological, physiological, motor, and psychological peculiarities of a school child's body, which needs to be taken into account when tackling issues of health protection during classes of physical culture. A teacher-practitioner directly paid attention to practical examples of how to provide health-protection orientation of classes of physical culture.

During group classes, seminars, practical seminars, interviews, we used such forms of discussion as round table and debates. Sometime we practiced lecture-discussions, during which the teacher initiated a dialogue with students on specific questions that require brief and quack answers. Primary aim of having a round table was to systematize available material in the given issue with further discussion and information exchange. An important aspect of this type of discussion is prior analysis of the issue. Based on the content of answers and their systematization, the moderator of the round table built a single concept of conducting a class. During the round table, a technically-equipped room and multimedia devices were used.

A distinctive feature of debates is availability of polar points of view regarding a certain problem. During debates students had to show skills in argumentation and public substantiation of personal point of view, which promoted development of critical thinking, formation of personal and professionally important qualities, culture of dialogue and discussion, skills in independent studies, development of tolerance, respectful attitude to various points of view.

The method of "brain storming" includes the search of answers regarding a certain issue based on intensive statements. Application of this method during classes enabled to analyze various issues of professional activity of teachers of physical culture, which is aimed at protection of students' health in secondary school.

The most successful combination of various aspects of professional activity in educational situations was reached with the help of didactic games. For example, let us analyze the scheme of conducting one of laboratory classes in "School course of physical culture and methods of teaching" on basis of application of didactic games.

Primary tasks of "Conduct lessons by ourselves" didactic game are improvement of skills of future teachers of physical culture in conducting a lesson of physical culture.

*Activity of students*. Students independently define the content of program material in physical culture for secondary school students, select modules of school program, formulate lesson's objectives, prepare lesson plan, conduct a lesson (or a part of it).

*Activity of a teacher*. Teacher helps a student to prepare for a lesson, formulate tasks, choose methods of studies, development of physical qualities, organization of work; define algorithms for solving the tasks of the lesson; select methodological materials regarding program module.

Prior to start the game, roles are given: one of the students is "a teacher", others are students from the primary medical group, students who are exempt from attending the classes perform the function of teacher's assistant, 1 – timekeeper, 1 – pulsometer keeper. After the lesson everyone turns into a "methodologist".

"The teacher" chooses topic of the class, announces it to students (they also have to prepare for the class) and prepares himself to conduct the lesson.

Primary task of "the teacher" is to efficiently distribute time needed to solve basic tasks of the lesson.

After the lesson is over, it is being discussed. "The teacher" is the one who speaks first: must do self-analysis of the lesson. After self-analysis, "methodologists" express their opinions. They have to know how to observe a class and how to analyze it based on the obtained information. The teacher sums up the role play and gives general evaluation to "students-methodologists" activity. Activity of "the teacher" is assessed by the teacher together with students. Together they sum up the results of the role play.

Then idea behind case-study educational technology lies in revealing and rethinking of real situation that at the same time reflects practical issue and actualizes a complex of special knowledge needed to solve it. During practical classes in "School course of physical culture and methods of teaching", structured case studies are offered to student. They include problem description, primary task, pedagogical situation, intermediate tasks, and materials to solve the problem. Workshop technology was tested when studying "Health-protection activity of a teacher of physical education under conditions of present-day school" module. When preparing to work in workshop format, an important task of a teacher was to assure combination of educational needs of every student with traditional necessity to give them knowledge as planned by curriculum and divided into separate content modules. Duration of work in workshop format was designed for 9 seminars, during which students had to learn material of five planned modules. At the first stage of every workshop, rules of work were explained to students, general aim of the lesson and its plan were defined, importance of the content of program material for future professional activity was substantiated. At the second stage of work by "Health of school children: problems and ways to solve them" topic, a problem situation was modeled; students had to answer the following question: why is the problem of training of future teachers of physical culture to work with health protection in secondary school actualized at current stage of development of educational system of Ukraine? The teacher defined three areas of discussion on the given topic: a) the issue of health protection of school children; b) professional reliability of a teacher of physical education; c) essence and components of health-protection activity. The process of search for answers on the given problem was done on the basis of "brain storming". When generating various pints of view, additional aspects of the issue were revealed.

At the third stage of work, points of view of students were structured by areas stated at the beginning. The work resulted in a table consisting of three divisions, each of which was divided into two columns: problems that mostly corresponded to one of the areas of discussion were defined in the left column; possible ways of their solution were to be written in the right column. Each participant had to have such table and fill it in with personal propositions throughout the entire work on the problem. The fourth stage is "immersion" in the problem. Each student had to choose the most topical area and, having defined personal aim, to try to reach it within interaction with others. The final "product" that proved achieving the goal was presentation of results of personal activity with the answer on a question regarding the topic.

The fifth stage is evaluation of participants' experience. At first, answers on questions regarding the topic were listened to and discussed. The, everyone analyzed personal experience in the form of a written resume, in which he elaborated on what he had learnt during the workshop.

In order to form positive attitude to healthy lifestyle, search and popularization of new forms of educational work, improvement of professional mastery, and development of creative activity, we engaged future teachers of physical culture in flash mobs. We viewed flash mob as both original form of organization of educational process, recreation and as a method of healthy lifestyle propaganda, which gives future teachers of physical culture knowledge and skills in formation of inner preparedness of students to improve personal health, sticking to elementary rules of hygiene, systematic physical exercises and sports. Positive psychologically-pedagogical aspects of flash mobs may include interest of participants, educational, development and preventive influence, possibility to quickly and unobtrusively convey the message to big audience, draw attention.

Organization of flash mobs envisaged the following: together with students, defining, solution of which problem this activity is aimed at, target audience, aim, objectives, time and place; formation of working group to organize the flash mob; division of responsibilities; rehearsals; agreement on having the flash mob with institute's administration; spreading the information about the event; preparation of material and technical supplies. For example, with the aim to form conscientious attitude to personal health, desire to do physical exercises and sports regularly, formation of skills in communication within preparation of various event, development of creative activity, emotional influence society for the sake of healthy lifestyle, we organized such flash mobs as "Being healthy is trendy!", "Life is great!", "Healthy children – successful country!" etc.

With the aim to analyze the state of implementation of interactive educational technologies into educational process of higher educational establishments of Ukraine, we polled teachers from higher educational establishments of Ukraine. Poll analysis showed that lectures-provocations are regularly used by 24.1% of respondents, rarely used by 41.4% of respondents, never used by 34.5% of respondents. Lectures-conferences are regularly used by only 10.1% of respondents, sometimes used by 49.9% of respondents, never used by 40.0% of respondents. The results of the poll show that currently, in higher educational establishments, the most popular among teachers are lectures-visualizations: 65.1% of teachers use them regularly, 24.6% sometime use them, 10.3% - never use them. The least popular forms of lectures are binary lectures: 2.5% of teachers use them regularly, 22.3% - sometimes use them, 75.2% - never use them.

Figure 1 shows results of the poll regarding teachers' use of such interactive educational technologies as discussions, brain storming, didactic games, case-studies, workshops, and flash mobs in their work with future teachers of physical culture.

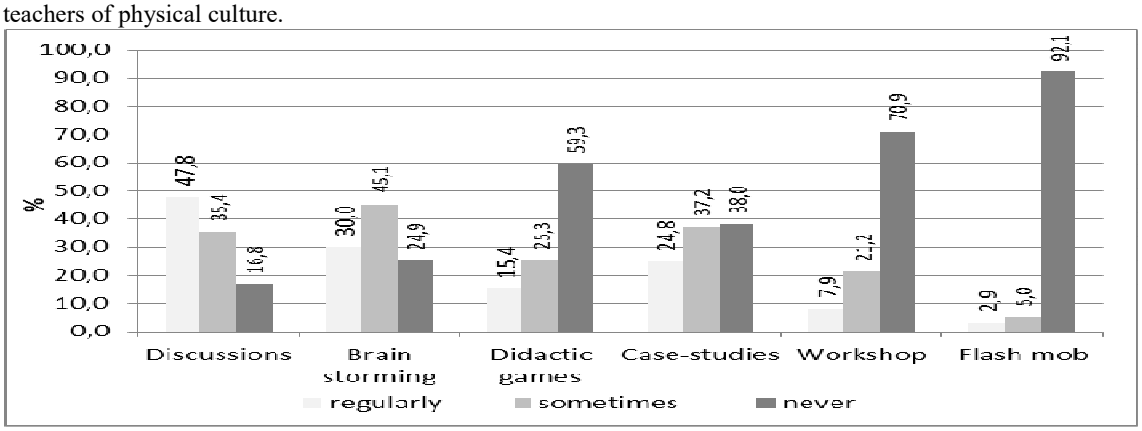


Fig. 1. Answers of teachers from higher educational establishments of Ukraine regarding their use of such interactive educational technologies as discussion, brain storming, didactic games, case-studies, workshop, and flash mob (%)

Analysis of teachers' poll regarding their use of the method of "discussion" in organization of educational process of future teachers of physical culture, professional activity of which will be aimed at health protection for school children allows to state that this method is regularly used by 47.8% of respondents, sometimes used by 35.4% of respondents? Never used by 16.8% of respondents.

The research revealed that the method of "brain storming" in organization of educational process of future teachers of physical culture is regularly used by 30.0% of respondents, sometimes used by 45.1% of respondents, never used by 24.9% of respondents. Regarding the use of didactic games, 15.4% of teachers use it regularly, 25.3% use it sometimes, 59.3% never use didactic games. Poll regarding the use of case-studies showed that 24.9% of teachers regularly use it, 37.2% sometimes use it, 38.0% bever use it.

Such interactive technologies, that are becoming more popular in the system of higher education around the world, as workshop and flash mob are least popular among teachers from higher educational establishments of Ukraine. In the process of professional training of future teachers of physical education to work with health protection in secondary school, workshop and flash mob are used by only 7.9% and 2.9% of teachers respectively, 21.22% 5.0% respectively sometimes use them, 70.9% and 92.0% respectively never use it.

Thus, analysis if the poll regarding teachers' use of interactive technologies in educational process of training of future teachers of physical culture to work with health protection in comprehensive school shows that under conditions of present day, a significant number of teachers (from 16.8% to 92.1%) do not use interactive technologies. In order to substantiate efficiency of the use of interactive technologies in the process of learning professionally-oriented subjects we did an experiment. Students from control groups studied by the traditional system of training. We implemented interactive technologies into the educational process of students from experimental groups. Based on the results of pedagogical testing, by the complex of specially designed tests, efficiency of acquiring theoretical knowledge in professionally-oriented subjects in control and experimental groups has been defined. Data that showed the level of formation of students' knowledge from control and experimental groups in professionally-oriented subjects as of the start of the experiment proved lack of statistically valid differences and showed homogeneity of the groups.

Results that showed the quality of learning material at the end of the experiment proved efficiency of application of interactive educational technologies. Thus, out of the maximum amount of points (50), students from control group scored 25,1±0,97 points while students from the experimental group scored – 30,3±0,95 points; probability of differences between the groups was $p<0,05$.

Table 1

Division of students from control and experimental groups by the level of knowledge on professionally-oriented subjects as of the end of the experiment

| Levels of knowledge | Control groups (n=64) | | Experimental groups (n=67) | | Δ % |
|---|---|---|---|---|---|
| | Number of people | % from overall number | Number of people | % from overall number | |
| High | 6 | 9,38 | 12 | 17,91 | 8,53 |
| Average | 33 | 51,56 | 44 | 65,67 | 14,11 |
| Low | 25 | 39,06 | 11 | 16,42 | 22,64 |

Table 1 shows division of students from the control and experimental group by levels of formation of knowledge in professionally-oriented subjects as of the end of the experiments.

After the experiment, 6 students from control groups (9.38%) and 12 students from experimental groups (17.91%) showed high level of formation of knowledge in professionally-oriented subjects; average level – 33 students from control groups (51.56%) and 44 students from experimental groups (65.67%); low level – 25 students from control groups (39.06%) and 11 students from experimental groups (16.42%).

**Discussion**

From the point of view of present day, with significant volume of educational workload, intensification of the process of studies, computerization, increase of psychological load, deterioration of ecology, low quality of physical and health-improving work as well as other factors that result in worsened health of youth, the issue of a quality formation of preparedness of future teachers of physical culture to work with health protection in secondary school gains significant value. Based on the analysis and generalization of scientific references, it has been revealed that quality of professional training of future teachers of physical culture depends on a number of factors. Based on research [Ayako Koyama, Shinichi Mizokami (2019), Yuanyuan Wang, Yukiko Kawai, Kazutoshi Sumiya.], a significant reserve regarding improvement of professional training of future teachers f physical education to work with health protection in secondary school was viewed by us in the implementation of interactive forms and methods of teaching. Our research proves that a big share of teachers from higher educational establishments of Ukraine do not use interactive educational technologies in the training process of future teachers of physical culture to work with health protection.

Implementation of interactive educational technologies called for substantiation of organizational and methodological conditions of their application in educational process of training of future teachers of physical culture taking into account specific features of professional competences regarding health protection.

In order to verify efficiency of the proposed organizational and methodological conditions for implementation of interactive educational technologies into the training process of future teachers of physical culture to work with health protection in secondary school, a pedagogical experiment was done.

Juxtaposition of the indices of formation of students' knowledge from control and experimental groups in professionally-oriented subjects at the end of the experiment proved efficiency of implementation of interactive educational technologies. Our data clearly prove results of research [Bazylchuk O., Putrov S., Bazylchuk V., Sushchenko L., Galina I., Danylevych M., Romanchuk O., Hrybovska I., Ivanochko V.] that state that application of interactive educational technologies allows to improve quality of training of future specialists in higher educational establishments and improve their level of professional skills and knowledge.

**Conclusions**

Organizational and methodological peculiarities of application of such interactive educational methods as lecture-provocation, lecture-conference, binary lecture, round table, debates, brainstorming, didactic games, case-studies, workshops, flash mob within the process of mastering professionally-oriented subjects by students who will major in "Physical education" have been substantiated.

It has been revealed that under conditions of present day, an extensive application of interactive educational technologies in the system of professional training of future teachers of physical culture has significant reserves for modernization and improvement of quality of training of future teachers of physical culture to work with health protection in secondary school. Results of the poll show that a significant number of teachers from higher educational establishments of Ukraine (from 16.8% to 92.1%) do not use interactive educational technologies in their work. The least popular technologies among teachers of physical culture from higher educational establishments of Ukraine are workshop and flash mob. Only 7.9% and 2.9% of teachers respectively use these technologies in the process of professional training of future teachers of physical culture to

work with health protection. Lectures-conferences and binary lectures are regularly used by only 10.1% and 2.5% of respondents.

Efficiency of application of interactive educational technologies within the training of future teachers of physical culture to work with health protection in secondary school has been experimentally proved, which is shown by the results of pedagogical testing that proved efficiency of obtaining theoretical knowledge in professionally-oriented subjects in control and experimental groups. Results that showed the quality of learning material at the end of the experiment proved efficiency of application of interactive educational technologies. As of the end of the experiment, students from control group scored 25,1±0,97 points while students from the experimental group scored – 30,3±0,95 points; probability of differences between the groups was $p<0,05$. High level of knowledge in control and experimental groups was shown by 9.4% and 17.9% of students respectively; average level – 51.6% and 65.7% of students respectively; low level - 39.1% and 16.4% of students respectively.

**Conflicts of interest.** The authors report no conflicts of interest.

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