

Health-Forming Technology of Physical Education of Higher Educational Institution Students Based on Sports-Oriented Training

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Abstract

Achieving a high level of physical culture and quality of life in Ukraine is an important condition for the practical implementation of the strategic task, namely, sustainable development of the country. The purpose of the paper is to study the issue of health-forming technology of physical education of higher educational institution students based on sports-oriented training. In the process of studying the impact of introducing sports-oriented training, an experiment was conducted. The experiment consisted in the fact that additional physical education classes were introduced for some students, namely, for the experimental group, table tennis classes were offered. The experimental group included 50 boys and 50 girls. The age of students ranged from 17 to 21 years. Students in the experimental group attended table tennis classes for one semester. Classes were held 3 times a week. After analysing the data obtained after the experiment, a comparison was made between the initial, final, and state-established regulatory indicators. Firstly, it can be concluded that table tennis classes had a positive impact on students' performance. Secondly, it is important to note that students are closer to the state-established indicators (for A grade). The practical significance of the study lies in the fact that after conducting an experiment with a small group of students, it can be concluded that table tennis classes had a positive effect on students' physical fitness, and therefore on their health. Thus, the introduction of such classes in all educational institutions both in Ukraine and around the world can be recommended.

Keywords: table tennis, higher education, physical culture, pedagogical technologies

1. Introduction

Achieving a high level of physical culture and quality of life in Ukraine is an important condition for the practical implementation of the strategic task, namely, sustainable development of the country. One of the main factors for solving this problem in the implementation of action strategies for the further development of Ukraine will be providing the necessary conditions for regular physical culture and sports throughout life for all segments of the population.

Innovations in the teaching activities of physical education teachers are very relevant nowadays. Unfortunately, as of 2021, the number of students exempted from physical education is growing. And most of them do not have any interest in physical activity. Therefore, it is becoming increasingly relevant for teachers to introduce new teaching methods, assessments, and engage students (Aasland et al., 2019). It can be said that in the life of almost every second modern young person, the period of studying at the university is the last period when it is still possible to correct the existing shortcomings of physical and mental development and even create a fundamentally new model of life and worldview without much effort and expense. Physical education of students provides large opportunities not only for the active use of health-improving technologies, which are now objectively lacking but also for their development, testing, and further application in the pedagogical process. Health-saving technologies of physical education, if they are applied to a particular student, should eliminate the possible negative impact on his body in the process of studying at a higher educational institution (Walseth et al., 2017).

Health-forming technology is a complex phenomenon that combines healthcare, medical education, and healthcare technologies. Health-saving technologies emphasise the external factor (creating favourable conditions for maintaining children's health, mastering various techniques and ways to maintain it) (Merino-Marban et al., 2015). Health-saving technologies focus on the internal factor (creating conditions for developing self-regulation skills, awakening the internal need to be healthy, mastering methods of increasing internal resources and opportunities). Health-saving technologies emphasise external and internal factors (the teacher works as a translator of knowledge, skills, and abilities of a healthy lifestyle) (Tudor et al., 2020).

In the modern world, such problems as saving, development, and strengthening of people's health are particularly important. After all, modern society is characterised by a decrease in the human development index, which characterises the health of Ukrainians and their average life expectancy. According to the Constitution of Ukraine, a person, his life and health are recognised as the highest social value, the development of which should ensure lifelong learning. Therefore, there is an objective need to develop health technologies and introduce them into the educational process not only of schools and preschool educational institutions but also of universities, which will ensure the development of competencies in the field of health and well-being among the younger generation, an appropriate health culture, and promote the priority of a healthy lifestyle among the population. The use of health-saving technologies will contribute to the comprehensive improvement of the content of the educational process and its educational environment from the standpoint of students' health (Tudor et al., 2019; Kondratenko et al., 2021).

One of the reasons for the negligent attitude of young people to preserving their own health is the state of the modern system of physical and health-improving education in universities of various professional orientations (Erdvik et al., 2021). Training students' health in the system of physical education includes not only the process of obtaining special knowledge and life competencies but also the development of appropriate life values, which results in their ability to independently "manage" their health, perform diagnostic, preventive, and, if necessary, rehabilitation and correctional measures. Designing an educational process for students' health requires the development of special wellness techniques and technologies for use in the physical education system (Kerner et al., 2018). The purpose of the presented paper is to study the issue of health-forming technology of physical education of higher educational institutions students based on sports-oriented training.

2. Method

The methodological base of the research is based on a combination of various general methods of scientific cognition. This study used methods of information analysis and synthesis, a comparative method, as well as the method of induction and deduction. At the final stage of the study, the method of analysing scientific literature relevant to the research subject was used.

The study used the method of information synthesis. Synthesis is the process of combining previously disparate concepts into one whole. Synthesis is also a method of combining the whole from functional parts. Unlike the analytical method, this method involves dividing the whole into functional parts. The study also used the information analysis method. Analysis is the process of dividing a complex subject or object into smaller parts to gain a broader understanding of the presented subject or object.

Comparison can be described as a logical technique that is necessary for any cognitive activity: at different stages and at different levels, regardless of the subject. Comparison can only be used as a special research method if the comparison procedure requires special training and special organisation. This need usually arises when comparing complex objects and phenomena that are characterised by a large set of different characteristics. The experience of comparative law shows that based on the comparative method, it is possible to solve not only scientific and educational, but also important applied problems. The comparative method was used at the final stage of the research to study and summarise the results obtained during the experimental part.

The study also used induction and deduction methods. The induction method is a method of research and presentation in which there is a transition from the observed particular facts to the identification of principles, general provisions of the theory, and the definition of regularities. Deduction is a way of thinking resulting in a logical conclusion, the validity of which is guaranteed by the validity of the assumption. In the process of studying the impact of introducing sports-oriented training, an experiment was conducted. The experiment consisted in the fact that additional physical education classes were introduced for some students, namely, for the experimental group, table tennis classes were offered. The experimental group included 100 students (50 boys and 50 girls). All students

were divided into groups of 10 people, which consisted of 5 boys and 5 girls. The age of students ranged from 17 to 21 years. Students in the experimental group attended table tennis classes for one semester. Classes were held 3 times a week.

The experiment was conducted in three stages. At the first stage, the physical fitness of students of the experimental group was tested. The results were recorded to compare them later. At the second stage of the experiment, direct classes were conducted for students. As mentioned above, classes were held for one semester 3 times a week (on Mondays, Wednesdays, and Fridays). Thus, 40 table tennis classes were held for students of 1-2 years. At the third (final) stage of the experiment, repeated testing of students' physical fitness was carried out. In the final part of the paper, a comparison of test results is presented and appropriate conclusions are drawn. At the final stage, the scientific literature was analysed. Analysis of scientific literature is an affordable research method but also the most demanding one. This method requires certain skills in working with literature: the ability to take notes, group the material according to the work plan. The main purpose of analysing literature sources is to collect scientific data on the subject under study, consider the prospects of research, and formulate a working hypothesis. When analysing the literature sources, various studies were considered.

3. Results and Discussion

At the beginning of the experimental work, the need to determine the starting indicators of students' physical fitness was noted. To do this, the experimental group was tested for the following types of physical activity: 3 kilometres running, squats for 1 minute, bending the torso forward from a sitting position, and standing long jump.

Figures 1, 2, 3, 4 show the average results of each experimental group, as well as ideal results in these categories of physical tests that would guarantee students the highest scores (i.e., A grade).

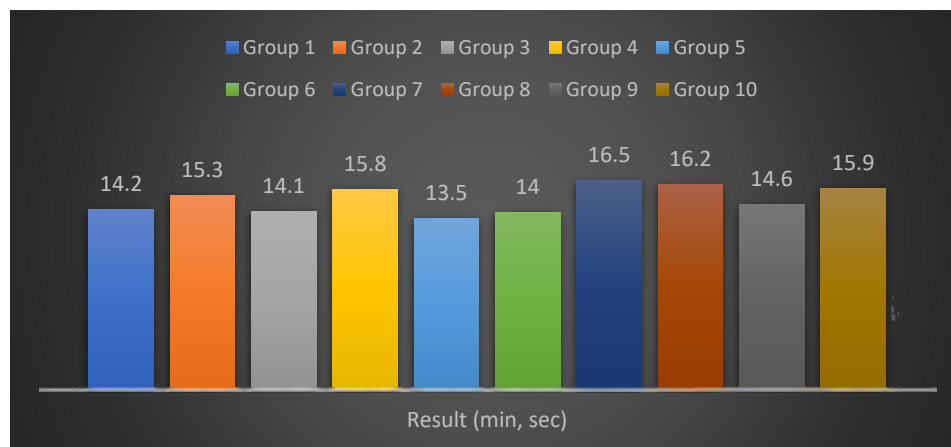


Figure 1. Results of Physical Fitness Testing in Students of the Experimental Group (3 km running)

From the data in Figure 1 and the conducted student testing, it is possible to determine the average result of groups of students in such a type of physical activity as running for 3 km ($Navg1$). Result for Group 1= $N1$, for Group 2= $N2$ etc. The average value for the experimental group in such an activity as 3 km running can be determined by determining the sum of the results of all groups and then dividing the found value by the number of groups (10 groups). Thus, the average value can be determined by the formula (1).

$$Navg1 = (N1 + N2 + N3 + N4 + N5 + N6 + N7 + N8 + N9 + N10) / 10 \quad (1)$$

$$Navg1 = (14.2 + 15.3 + 14.1 + 15.8 + 13.5 + 14 + 16.5 + 16.2 + 14.6 + 15.9) / 10 = 15.01 \text{ min, sec}$$

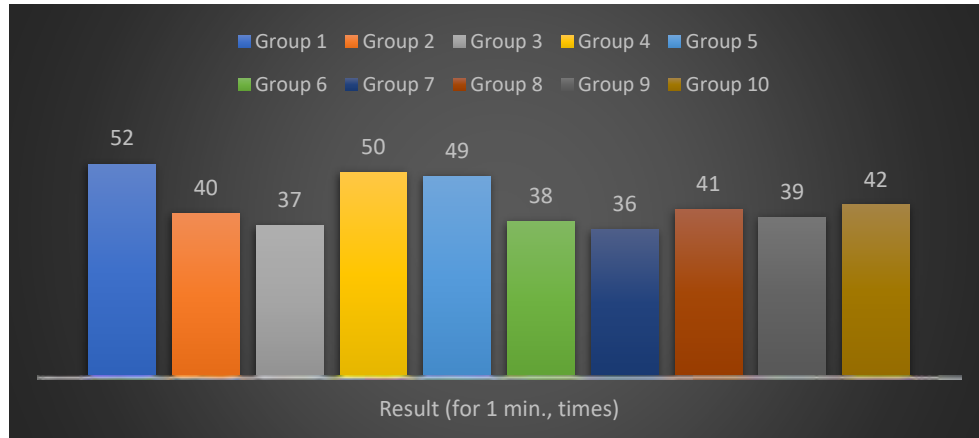


Figure 2. Results of Testing the Physical Fitness of Students of the Experimental Groups (squats for 1 minute)

From Figure 2, the average result of students in the experimental groups for squats for 1 minute can be determined (Z_{ser1}). Result of Group 1= Z_1 , groups 2= Z_2 etc. Let us determine by the formula (2).

$$Z_{avg1} = (Z_1 + Z_2 + Z_3 + Z_4 + Z_5 + Z_6 + Z_7 + Z_8 + Z_9 + Z_{10}) / 10 \tag{2}$$

$$Z_{avg1} = (52 + 40 + 37 + 50 + 49 + 38 + 36 + 41 + 39 + 42) / 10 = 42,4 \text{ times/min}$$

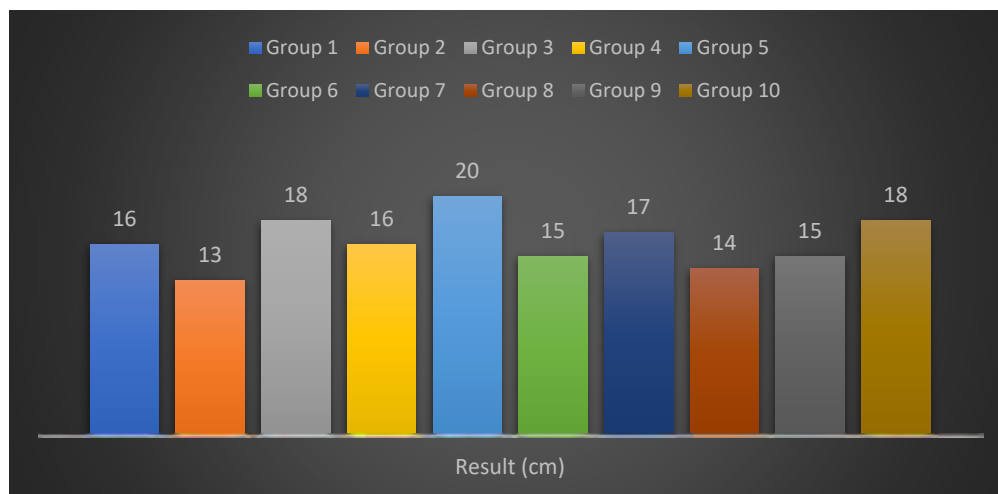


Figure 3. Results of Testing the Physical Fitness of Students of the Experimental Groups (bending the torso forward from a sitting position)

From Figure 3, the average result for students of the experimental groups for bending the torso forward from a sitting position can be determined (P_{avg1}). The average result can be determined by the formula (3).

$$P_{avg1} = (P_1 + P_2 + P_3 + P_4 + P_5 + P_6 + P_7 + P_8 + P_9 + P_{10}) / 10 \tag{3}$$

$$P_{avg1} = (16 + 13 + 18 + 16 + 20 + 15 + 17 + 14 + 15 + 18) / 10 = 16.2 \text{ cm}$$

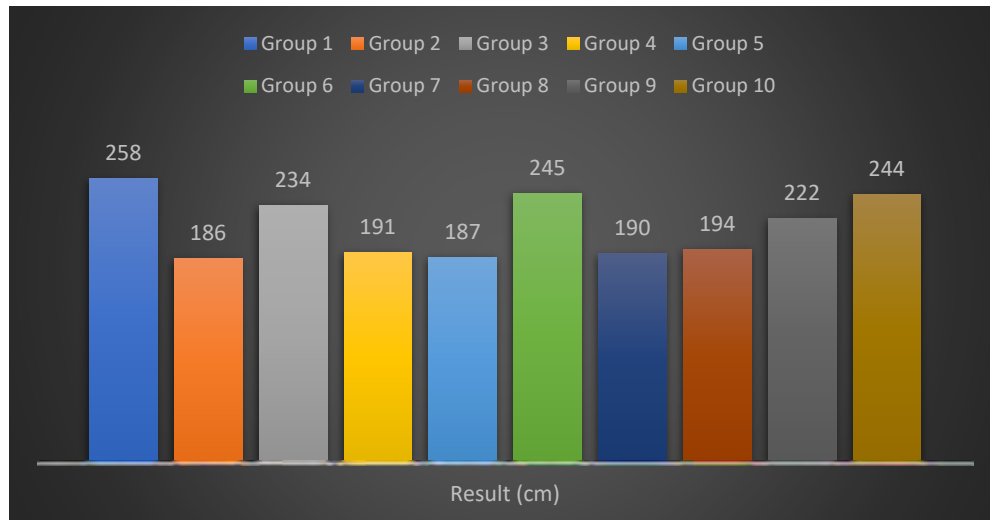


Figure 4. Results of Testing the Physical Fitness of Students of the Experimental Groups (standing long jump)

Figure 4 shows the results of testing the physical fitness of students of the experimental groups for the standing long jump (S_{avg1}). The average result can be determined by the formula (4).

$$S_{avg1}=(S_1+S_2+S_3+S_4+S_5+S_6+S_7+S_8+S_9+S_{10})/10 \quad (4)$$

$$S_{avg1}=(258+186+234+191+187+245+190+194+222+244)/10=215,1 \text{ cm}$$

To improve the standard indicators of physical fitness of students, as well as to improve their well-being and physical condition, it was decided to introduce experimental table tennis classes.

Table tennis (ping-pong) is an Olympic sport in which two players or two teams of two people (doubles) compete with each other, trying to throw a special ball with rackets (through the net on the table) in the direction of the opponent. The ball must touch the opponent's half of the field at least once. Now it is difficult to say in which country table tennis appeared (Aasland et al., 2019). Some believe that table tennis first appeared in Japan or China, while others believe that its homeland is France or England. Several historians are looking for the origin of the game in Ancient Rome. Despite all these controversies, it is safe to say that the history of table tennis goes back to the distant past (Yu et al., 2021). Table tennis develops not only physical but also moral and volitional qualities. These are strength, dexterity, quickness of reaction, and the ability to anticipate the situation at the table. Table tennis also develops fine motor skills. In sports like table tennis, strength does not develop in the literal sense of the word. Admittedly, when playing tennis, the arm muscles will not be the same as those of bodybuilders. However, the muscles undoubtedly become relieved through the shoulder joint, biceps and triceps, as well as the arm muscles (Mayorga-Vega et al., 2016). In terms of agility and quickness of reaction, table tennis perfectly develops these qualities. After all, during a good game, the ball flies very quickly, so one needs to act with all dexterity and speed not to lose points. The situation at the table usually develops instantly, so the player must also have certain skills to anticipate future actions. And literally in a split second, predict the opponent's action, predict the direction of the ball's flight and force, and identify the action plan (Yu et al., 2021).

A very large load in this game is supposed to be put on the legs of players. The legs perfectly cope with the movement of the athlete at the table, their work is an important factor in the game. Therefore, the leg muscles of table tennis players are very well trained and this can considerably improve performance in other sports, such as running. This means that table tennis can be included in the training system of some athletes in other sports (Schmidt et al., 2013). Table tennis also has a considerable impact on the health, cardiovascular and respiratory systems. When moving from one edge of the table to the other, the heart muscles receive a load comparable to running on uneven terrain. And the better the heart is trained, the lower is the risk of heart disease in players. The respiratory system can also develop during intense play and have a very beneficial effect on players' health. During the game, the lungs are constantly ventilated, their work is improved and trained (Yu et al., 2021).

It is also important to note the positive impact of learning on the human vision system. This sport is especially useful for those who spend a lot of time at the computer. The eyes are constantly overloaded and tired (Redelius et al., 2015). While playing table tennis, the eye muscles are trained because the eyes must follow the rapid movement of the ball, as well as quickly react while still observing the actions of the opponent. Table tennis also has a great influence on the coordination of movements because the player will have to quickly hit the flying ball, and therefore the player cannot do without precise and coordinated movements of the whole body (Yu et al., 2021).

Table tennis class progress:

1. Organisational aspects: building and setting goals and objectives. Before starting the lesson, students are given a task to apply the acquired knowledge during the game.
2. Preparatory stage: warm-up, the teacher tells students some theoretical points.
3. The main stage: running exercises, play (students are divided into pairs).
4. Final stage: summing up the results.

At the third (final) stage of the experiment, repeated testing of students' physical fitness was carried out.

It can be concluded that table tennis classes had a positive impact on students' performance. Secondly, it is important to note that students are closer to the state-established indicators (for A grade). Thus, after conducting an experiment with a small group of students, it can be concluded that table tennis classes had a positive effect on students' physical fitness, and therefore on their health. Thus, the introduction of such classes in all educational institutions both in Ukraine and around the world can be recommended.

A large number of researchers have studied the issues of health-forming technology of physical education of higher educational institutions students based on sports-oriented training. To study this problem, it is important to consider some research. The paper by Sysoev and co-authors deals with the problem of using health-saving technologies in the process of students' physical education. The authors study the experience of practitioners, as well as give their own vision of this process. Sysoev and co-authors propose the author's method of professional and applied physical training, as well as give some results of its implementation in the educational process. In the final part of the study, the authors outline ways of further research. The authors note that the modern health-saving technology of physical education should include comprehensive methods of not only conducting training sessions but also extracurricular forms under the guidance of a teacher, as well as all kinds of independent types of motor activity. Thus, regular physical training becomes a need for every sane person (Sysoev et al., 2020).

The paper of A.Y. Khoroshev (2016) and co-authors considers the concept and content of health-saving technologies specifically for students' physical education, content tools to be used in the pedagogical process of students' physical education. The authors note that studying the experience of scientists and teachers of higher educational institutions on the problem of preserving and strengthening the health of students, it was established that the problem of educating a healthy generation is becoming increasingly important. According to the authors, the main purpose is the stimulation of a healthy lifestyle of all educational process participants: teachers and students. Observations show that health-saving technologies in the educational process allow students to adapt more successfully to the social and educational world, develop their creative abilities, and help teachers to effectively prevent deviant behaviour.

The paper of I.G. Dorovsky (2015) describes the concept and content of health technologies concerning the context of physical education of university students, as well as the content of physical culture, which will be used in the pedagogical process of physical education of students to create physiologically favourable conditions for their education and other creative activities. The author points out that the solution to this problem will be facilitated by conducting practical physical education classes with students using medical technologies. The purpose of using various health-saving technologies of physical education is the maximum "physiologisation" of this pedagogical process, which aims to return the natural character of motor activity to each young person, without conventions and restrictions imposed by civilisation. Only such "naturalisation" of physical education will contribute to the real solution of students' health problems through physical exercises and maintaining optimal homeostasis in conditions of increased dynamic activity of the individual and ensure its metabolic processes.

T.N. Shutova (2017) demonstrated the classification of fitness programmes and technologies in the context of their application in students' physical education. The author covered a variety of strength, psycho-regulatory, combined, aerobic, close fitness programmes, as well as features of sports, recreational and rehabilitation technologies, their adaptation for students of different levels of physical fitness, medical group. The study showed the results of sociological studies and the level of the functional status of students at the beginning of physical education lessons.

Based on the obtained material, modelling of fitness technologies for young men of the main group can be based on sports, recreational fitness technologies (Gymnastics, CrossFit, functional training, mixed programmes), for young men of the special group, recreational and rehabilitation technologies were proposed (aqua fitness, gymnastics programmes, billiards, circular fitness exercises, gymnastics with a barbell, changed mixed programmes). It is recommended to conduct sports for girls from the main group in the second year of study. Such types of classes as aqua aerobics, gymnastics, step aerobics of medium and low intensity, "Tai-Bo" of medium intensity were offered for the first year. Aqua fitness, billiards, pilates, yoga, gymnastics, fitball, and stretching were offered for girls of a special group.

The paper of O.B. Olkhovska (2018) presents the results of theoretical studies of the professional and educational potential of physical education for students of general pedagogical educational institutions. The author suggests a way to organise professional and applied physical education for future teachers. Sports games are presented as a pedagogical technology that optimises the development of bachelor's competencies. Some conclusions were drawn in the paper of O.B. Olkhovska. Physical education in higher educational institutions should be applied professionally from the standpoint of a competency-based approach and solve two problems: health care and professional training. The means of professional and applied physical education (PAPE) of students are selected considering the professional profile of future professional activity to optimise the development of professional competencies by successfully educating professionally and socially important qualities. The most effective means of PAPE for students of pedagogical universities are physical exercises organised in the form of sports games. The educational process in the discipline "Applied Physical Culture" and additional classes in sports sections should also be organised as a game pedagogical technology that guarantees the expected result. Pedagogical technology based on sports games combines the functions of education, upbringing, and healthcare. For students of pedagogical universities classified in a special medical group for health reasons, table tennis is the optimal means of PAPE. This sports game balances the motor mode of students with cardiovascular, respiratory, musculoskeletal, and visual diseases.

I.M Skulkova, R.A. Abdurakhmanov (2020) note that today, during the intensive reform of higher education, characterised by changes in the content of education, updating the forms and methods of teaching, it is necessary to review the conventional means and methods of teaching physical education. One of the priority areas of modernisation of general education is the introduction of innovative technologies in the teaching of physical culture. The authors note that individual work with students is carried out on the institute's website on the platform of physical culture. The teacher offers a set of exercises that determine the number of performances and approaches, as well as describe the technique of performance. The student must not only complete them but also record the performance on a video and send it to the teacher. The teacher will also ask the student to create and perform their own series of exercises, for example, for strengthening certain muscle types, and send the teacher a video report with a written response that will include the exercises and their technique, the selected exercises. This area focuses on selecting exercises that students can perform physically and according to their abilities, for example, using existing sports equipment, etc.

Review of various pedagogical technologies, author's methods, and programmes in the field of students' physical education allowed drawing the conclusion that health technologies with a wide arsenal of tools will become a factor and type of education that will improve students' physical health, physical and professional training of future specialists. There is a need to introduce into the educational process such health technologies that will consider the needs and preferences of students, their individual characteristics, the specific features of future professional activities. The paper suggests mechanisms for using health-improving technologies in the educational space of universities as a result of the digital transformation of the university. Based on the programme requirements, a sequence of introduction of various types of motor activity (or their combinations) into the process of physical education was developed in coordinated interaction with the means of physical education (health-improving forces of nature and hygienic factors). The main purpose of creating a digital university is to transform the main and management processes in the university using digital technologies. The digital university model means using the latest technologies in the educational process, integrating online platforms into the usual environment, introducing personalised educational trajectories and courses, new opportunities for space and formats (Kuznetsova and Kolyada, 2020).

The paper of J. Yu (2021) and co-authors notes that modern information technologies are increasingly being used in school physical education. Therewith, the use of multimedia technologies in education is becoming more extensive. As a teaching method, multimedia has become an important component of modern educational technologies and science and also provides support for learning reform. The use of multimedia organisation of training can compensate for the shortcomings of conventional physical education, promote the development of physical education,

educate students about sports throughout life, and improve physical fitness. Physical education is an important component of modern education and its reform is also a trend of the time. According to the characteristics of a regular student table tennis group, the use of a multimedia learning platform can make table tennis classes more vivid and interesting, allow students to acquire some basic table tennis skills and abilities in a short period, understand and feel table tennis. Competitions increase students' interest in doing sports their whole lives.

Today and in the future, the status of school physical education is of great concern on an international scale. Recent studies have used surveys or case studies to examine the state of physical education but there is a lack of in-depth analysis of physical education training documentation. The purpose of this study is to contribute to the international debate about physical education curricula by expanding previous interpretations of Canada's physical education curricula and drawing attention to additional aspects that may have been overlooked. The results of an analysis of 10 provincial physical education curricula in Canada identify trends and topics related to the distribution of study time, the formulation of curriculum goals, the categories of curriculum organisation, and statements of learning outcomes. While the stated purpose of physical education curricula in Canada is focused on a healthy and active lifestyle, there is evidence that the particular content of learning outcomes formulations is more focused on motor skills, games, and athletic technique. This contradiction raises further discussions about the philosophical and theoretical foundations of physical education curricula and the importance of understanding what should possibly influence decisions about curriculum development around the world (Kilborn et al., 2015).

4. Conclusions

Based on the analysis of literature sources, it was concluded that table tennis classes can be used in the system of teaching physical culture in universities since regular table tennis classes contribute to comprehensive physical development and health improvement. Students of the experimental group have shown a greater increase in physical fitness. Prospects for further research are the introduction of basic table tennis classes into the educational process of physical education of university students during their studies.

Health-forming technology is a complex phenomenon that combines healthcare, medical education, and healthcare technologies. Health-saving technologies emphasise the external factor (creating favourable conditions for preserving children's health, mastering various techniques and ways to maintain it). Health-saving technologies focus on the internal factor (creating conditions for developing self-regulation skills, awakening the internal need to be healthy, mastering methods of increasing internal resources and opportunities). Health-saving technologies emphasise external and internal factors (the teacher works as a translator of knowledge, skills, and abilities of a healthy lifestyle). At the beginning of the experimental work, the need to determine the starting indicators of students' physical fitness was noted. To do this, the experimental group was tested for the following types of physical activity: 3 kilometres running, squats for 1 minute, bending the torso forward from a sitting position, and standing long jump. After analysing the data obtained after the experiment, a comparison was made between the initial, final, and state-established regulatory indicators. Firstly, it can be concluded that table tennis classes had a positive impact on students' performance. Secondly, it is important to note that students are closer to the state-established indicators (for A grade).

Thus, after conducting an experiment with a small group of students, it can be concluded that table tennis classes had a positive effect on students' physical fitness, and therefore on their health. Thus, the introduction of such classes in all educational institutions both in Ukraine and around the world can be recommended.

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