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# Professional development of physical education teachers through innovative technologies



## Desarrollo profesional de docentes de educación física a través de tecnologías innovadoras

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### Abstract

The content of the research concepts is analyzed; the elements, qualities, structure, and factors of the professional skills of a physical education teacher related to innovative technologies are considered; the organization of an innovative educational process is described based on modern technologies and methods



of the educational process, effective, innovative methods, forms and technologies necessary for the formation of professional skills of a physical education teacher are analyzed. In the process of the study, we set the task – to develop and substantiate a methodology for the formation of professional skills of future physical education teachers in higher education institutions in the process of studying professional disciplines based on modern technologies and methods of the educational process, and also to determine whether it ensures the quality of professional training, the effectiveness of training, whether it contributes to the implementation of innovative teaching technologies, the formation of professional skills of students. The obtained data indicate positive changes in the educational process of future physical education teachers thanks to the methodology of forming professional skills based on modern technologies and methods of the educational process.

**Keywords:** formation of professional skills, future physical education teachers, modern immersive technologies, active, innovative methods, interactive applications, technologies of augmented and virtual reality.

## Resumen

Se analiza el contenido de los conceptos de investigación; se consideran los elementos, cualidades, estructura y factores de la competencia profesional del docente de cultura física, que están relacionados con tecnologías innovadoras; Se describe la organización del proceso educativo innovador basado en tecnologías y métodos modernos del proceso educativo, se analizan métodos, formas y tecnologías innovadoras efectivas necesarias para la formación de la habilidad profesional del docente de cultura física. En el proceso de investigación nos propusimos la tarea de desarrollar y justificar la metodología para la formación de habilidades profesionales de los futuros docentes de educación física en instituciones de educación superior en el proceso de estudio de disciplinas profesionales basadas en tecnologías y métodos modernos del proceso educativo. , así como determinar si garantiza la calidad de la formación profesional, la eficacia de la formación, si contribuye a la implementación de tecnologías de aprendizaje innovadoras, la formación de habilidades profesionales de los estudiantes. Los datos obtenidos indican cambios positivos en el proceso educativo de los futuros profesores de cultura física gracias a la metodología de formación de habilidades profesionales basada en tecnologías y métodos modernos del proceso educativo.

**Palabras clave:** formación de habilidades profesionales, futuros profesores de educación física, tecnologías inmersivas modernas, métodos activos e innovadores, aplicaciones interactivas, tecnologías de realidad aumentada y virtual.

## Introduction

In the modern world, there is a need for proactive, educated, effective, creative, active, and, most importantly, competitive professionals. That is why society places such demands on the personality of a teacher, and it is these demands that require significant efforts and dedication from the teacher. In the modern educational space, the innovativeness and competitiveness of future physical education teachers come to the fore because it is precisely the specialists who can overcome and solve the problems that arise before them, specialists who have the skills to introduce innovations into the educational process, who are highly qualified. It is not enough to be a teacher; you need to practice a lot, be a master of your craft, love your craft, and only then can you be considered a master teacher.

The professional and everyday activities of physical education teachers in the modern educational space depend on many indicators – changing the vector of individual aspirations and motivation, changes in the social, cultural, and scientific spheres, and the emergence of new ways to self-development and self-realization. That is why a modern person must be able to adapt to the world and be ready to master the competencies, qualities, and new information that will help him or her to realize himself or herself in the modern world. The same requirements are faced by future physical education teachers, who, while studying in higher education, must already develop and form those qualities that will help them in effective



professional and pedagogical activities and the implementation of their plans. (Honcharenko & Shevchenko, 2024).

We believe that professional skills are one of the most important factors in the personality of a physical education teacher, who is a true specialist and a professional in his field. Therefore, the issue of forming the professional skills of a physical education teacher based on modern technologies and methods of the educational process is determined by a new competency-based approach, which is being established in the educational process and is relevant.

The relevance of our research is determined by the low level of application of pedagogical innovations, the inconsistency of the methods of training and content of physical education teachers with modern requirements for the formation of professional skills of a physical education teacher based on modern technologies and methods of the educational process; the slow introduction of innovative modern methods in the training of future physical education teachers; the effectiveness of the system of physical education of the individual.

## Literature Review

In recent years, several educational and scientific literature have been created to form a comprehensively developed personality of a teacher, increasing the level of professional skills of a physical education teacher, capable of creatively solving modern educational tasks when teaching schoolchildren in the process of their physical development.

The concept of "professional skills" is considered by T. Khoma (2021), and the ways of forming professional skills in future physical education teachers are outlined, and the components of professional skills are determined. The professional skills of a physical education teacher are considered from the point of view of the innovativeness of the educational process, the quality of performing pedagogical tasks, the manner of behavior, and the presence of pedagogical tact. The elements of professional skills are highlighted. The author presents his own interpretation of the professional skills of a physical education teacher, who possesses professional competence, encompasses a set of personal qualities, possesses innovations in the education system, is capable of self-development creativity, and is characterized by formed moral, ethical, and civic qualities.

In the conditions of the educational process of higher education, L. Chendakova (2020) highlights the features of the formation of professional skills in future teachers. Professional skills are presented as a complex of personality properties that, on a reflexive basis, provide a high level of self-organization of professional activity and combine the professional competence of the teacher with his personal and business qualities. It is proven that the professional skills of a teacher are based on pedagogical experience, general culture, high professional level of the teacher, the use of effective teaching methods, the organization of the educational process, the environment in which the educational process takes place play a significant role in the formation of professional skills of future teachers. A favorable educational environment is presented as an environment in which, with the help of the professional skills of the teacher, the interaction of all subjects of the pedagogical process is effective, physical, spiritual, moral, intellectual, and aesthetic mutual enrichment.

I. Honcharenko and O. Shevchenko (2024) highlight the features of the formation of professional skills of the future physical education teacher and analyze professional skills as a certain phenomenon, which is expressed in the productive and procedural aspects, as pedagogical activity. In the content of the concept of "professional skills of a physical education teacher", scientists include the ability to use various forms of conducting physical education classes, the choice of appropriate teaching aids and methods of the educational process, the formation of motor abilities and skills in various types of motor activity; the focus on the development and improvement of the physical condition of students of professional and pedagogical activity; the formation of positive motivation in students for motor activity and physical education classes.



Indicators of the levels of professional development of future physical education teachers are specified by M. Osadets and S. Horodynskiy (2024). In the context of continuous improvement of professional skills, formation of the need for professional self-development of a specialist in the field of sports, and renewal of the educational process in higher education, the problem of professional training of future physical education teachers is considered. The structure of professional self-development of future physical education teachers is considered to be a set of three interrelated components: reflective, motivational-emotional, and content-operational. The problem of professional training of future physical education teachers is considered in the context of continuous improvement of pedagogical skills for scientists, students, and teachers working in the field of physical education.

When analyzing the professional training of future physical education teachers, A. Protsenko (2017) considered the stages of the formation of physical education and health-improving, professional, and health-preserving competencies. The following were analyzed: readiness for pedagogical activity based on acquired skills and knowledge, main trends of the professional qualification system, criteria for the readiness of future physical education teachers: mastery of pedagogical operations and actions, methodological thinking, pedagogical orientation, and reflection.

O. Dyshko (2023) analyzes the problem of preparing future physical education specialists for sports and tourism activities. It is proven that a significant factor in further professional activity and the training of future physical education teachers is sports and tourism activities. The essence of the readiness of future physical education specialists for professional activity is revealed by the scientist, and the qualities of specialists in sports and tourism support and the main components of the professional activity of physical education specialists are determined. The latest problems in the field of sports tourism are indicated, the features of the sports component of a tourist trip are revealed, the social significance of sports tourism is outlined, the place of sports tourism in the field of physical education is determined, which is important for future physical education teachers.

Generalization of pedagogical experience and theoretical analysis of the works of scientists made it possible to find out that scientists considered the content of the concept of "professional skill" identified elements of professional skill; highlighted the features of the formation of professional skill in future teachers in the conditions of the educational process of higher education; in the context of continuous improvement of professional skill, the need to form a need for professional self-development in the individual, updating the educational process in higher education, was proven; considered the stages of the formation of physical culture and health-improving, professional, health-preserving competencies. However, the features of the formation of professional skills in future physical culture teachers based on modern technologies and methods of the educational process are not sufficiently highlighted in the scientific discourse.

**Purpose of the research.** To find out the features of the formation of professional skills in future physical culture teachers based on modern technologies and methods of the educational process.

## Methodology

**RESEARCH METHODS:** theoretical: comparison, analysis, modeling, generalization, synthesis were used to study the literature on the research problem and determine the theoretical foundations of the study, clarify the features of the process of clarifying the features of the formation of professional skills in future physical education teachers based on modern technologies and methods of the educational process; empirical: observation and analysis of the educational process in higher education, conversations with students, teachers, lecturers, questionnaires and surveys of teachers and students, methods, self-assessment to identify the level of formation of professional skills based on modern technologies and methods of the educational process, an experiment to test the effectiveness of the methodology for the formation of professional skills based on modern technologies and methods of the educational process; quantitative and qualitative analysis of the results based on mathematical statistics, which were used to establish quantitative relationships between phenomena and processes, processing the data obtained.



In the process of the experimental study, we set the task – to develop and substantiate a methodology for the formation of professional skills of future physical education teachers in higher education institutions in the process of studying professional subjects based on modern technologies and methods of the educational process, and also to determine whether it ensures the quality of professional training, the effectiveness of training, whether it contributes to the implementation of innovative teaching technologies, the formation of professional skills of students.

At the ascertaining stage of the experimental study, the formation of the components of professional skills in graduate students was studied. For this, we determined the level of formation of students' professional skills, identified the need to develop the components of professional skills in future physical education teachers, and also established the degree of importance of the use of innovations in teaching professional disciplines. A questionnaire with closed-ended questions was used for this purpose and studied the respondents' self-assessment of the level of formation of professional skills of future physical education teachers. A study was conducted among practicing teachers of the level of development of professional skills at the end of the ascertaining experiment to identify the reserves of the educational process of higher education in terms of the formation of components of pedagogical skill and to verify the interdependence of professional skill and pedagogical experience.

Based on the ascertaining experiment (obtaining data), it was found that the training of future teachers requires the search and application of more effective teaching methods and methods of organization that lead to improving skills, developing the student's personality, and not only the assimilation of knowledge.

A formative pedagogical experiment was conducted with graduating students. Two groups: CG and EG, were formed before the start of the experiment.

To test the hypothesis of positive dynamics of professional knowledge and skills in work, the following were used: the  $\chi^2$  criterion – to determine the independence of the EG and CG samples, calculation of the mathematical expectation and variance – to evaluate the learning outcomes.

During the formative experiment, considerable attention was paid to the methodology for the formation of professional skills based on modern technologies and methods of the educational process. At the end of the formative experiment, the experimental data were processed and systematized, the results obtained were summarized and compared with the predicted ones, conclusions were formulated, and prospects for further research of the outlined problem were determined.

The purpose of the formative stage of the experiment was to verify the effectiveness of the methodology for the formation of professional skills of future physical education teachers based on modern technologies and methods of the educational process.

Sixty-two students studying in the last years of higher education took part in the experiment. An EG (30 respondents) and a CG (32 respondents) were formed.

It was determined using the  $\chi^2$  criterion that the formed groups, with a probability of 0.99 ( $\alpha < 0.01$ ), are homogeneous. The data obtained indicate positive changes in the educational process of future physical education teachers thanks to the methodology for the formation of professional skills based on modern technologies and methods of the educational process.

We observe in the EG the highest results of the growth of organizational, gnostic, and constructive design skills. And in general, we observe positive dynamics in all skill groups.

When comparing the mathematical calculations of the studied samples – the calculation of the Student's t-criterion showed a significant difference ( $t = -4.52$  with statistical significance  $p = 0.01$ ) between the CG





and the EG. That is, the level of training of CG students differs from the level of the EG with the necessary statistical reliability.

## Results and Discussion

### Content of the research concepts.

The need of the hour is to increase professional skills today teachers, which includes a characteristic of a high level of professional activity. The criteria for the professional skill of a teacher in his activity are the following features: professional expediency, scientificity, creativity, humanity, effectiveness, optimal nature of the educational process, democracy, originality of approaches to educational activity (Mytnyk et al., 2024).

The professional skills of a physical education teacher are:

- A combination of the teacher's worldview, personal culture, knowledge, comprehensive theoretical training based on best practices, modern techniques, technologies, and methods of the educational process, teaching and upbringing, and pedagogical innovative technology of the educational process.
- A type of activity that characterizes the internal sphere of a physical education teacher: the desire to become a master of pedagogical work; establishing oneself as a highly qualified specialist; the belief that skill provides a sense of satisfaction from work, and not only efficiency (Knysh et al., 2024);
- The skill of a physical education teacher consists of the methodology of forming professional skills based on modern technologies and methods of the educational process, observing general norms of behavior, teaching students to perform exercises at a high level, comprehending and perceiving the unknown and new; organizing self-control, control and behavior; teaching students to design actions; directing all elements of the teacher's and students' activities to the final result of a physical education lesson and other forms of classes (Babalich et al., 2023);
- The skill of a physical education teacher is the quality of performing professional tasks and, from the point of view of axiology, depends on the axiological orientation of the teacher's personality, his professional and personal qualities, methodological experience, and creative approach to the educational process (Dzhurynskyi et al., 2023).

### Elements, qualities, factors, and structure of professional skills of a physical education teacher that are associated with innovative technologies.

Elements of pedagogical skills of a physical education teacher are professional competence, humanistic orientation, pedagogical technique, and pedagogical professional abilities (Kulyk et al., 2023).

We consider professionally important qualities of the development of professional skills of a physical education teacher from the position of their formation. These are aesthetic views, moral consciousness, scientific worldview; emotional-sensory, volitional, and intellectual activity of the individual; psychophysiological, general physical readiness; style and manner of behavior, pedagogical tact; creative pedagogical search, possession of psychological and pedagogical relevant, innovative skills and knowledge to organize physical education classes, physical culture and health work, participation in scientific research work; ability to self-improvement throughout life (Matviichuk, 2015).

The importance of the professional skills of physical education teachers is expressed through factors related to innovative technologies:

- 1) For competitiveness and demand for teachers in the labor market, the level of professional thinking of a physical education teacher determines the level of creative potential to implement innovative components in professional activities;



- 2) The use of non-standard approaches to increase the level of theoretical content of professional disciplines, which leads to an aggravation of the contradiction between the real ability of a physical education teacher to solve the tasks facing him and the general goals in the educational world society;
- 3) An increase in the educational space of the educational and methodological base and innovative forms of teaching, new various educational technologies (Yazlovetska & Shevchenko, 2018).

The state puts forward certain requirements for the professional skills of physical education teachers, the personality of a future physical education teacher, including several general, general, and special competencies, the special and general culture of the teacher's personality, the teacher's pedagogical and special skills, and competence in implementing innovative technologies in the educational process (Honcharenko & Shevchenko, 2023).

Let us describe the structure of the professional skills of physical education teachers:

- 1) Professional competence, which can serve as the foundation of professional skills, adding solidity, depth, and consciousness;
- 2) Humanistic orientation, which is a system-forming component that is expressed in the value orientations of physical education teachers during the implementation of the teacher's self-affirmation, the goals of the specialist's pedagogical activity, as well as in his system of pedagogical interaction with students in the form of a humanistic strategy;
- 3) Pedagogical technique, which combines all means of pedagogical interaction and action, relies on the abilities and knowledge of the individual for effective pedagogical activity:
  - Organizational, didactic skills of mastering the technique of contact interaction, the ability to interact in the process of solving pedagogical tasks;
  - The ability to manage oneself (mastery of speech technique, emotional state, body);
- 4) Pedagogical abilities that facilitate the successful performance of professional functions by a physical education teacher ensure the speed of skill development:
  - Perceptive abilities (pedagogical intuition, empathy, professional vigilance);
  - Communicativeness (sociability, friendliness);
  - Personal dynamism (ability to logically persuade and influence the individual);
  - Ability to control oneself (emotional stability);
  - Ability to be creative (creativity);
  - Optimistic forecasting (Shuliak et al., 2022).

### **Organization of an innovative educational process based on modern technologies and methods of the educational process.**

In the formation of professional skills of physical education teachers, the organization of an innovative educational process based on modern technologies and methods of the educational process plays a significant role. After all, it is in the process of educational activity of higher education that self-respect, self-esteem, tolerance, responsibility, independence, the ability to discuss and defend one's beliefs, and acceptance of the point of view of others are leveled or developed.

It will depend on what educational methods we use and whether we will form in an individual the ability to defend democratic changes based on modern technologies and methods of the educational process. Also, the process of exchange of experience and interaction between the applicants for higher education themselves. To systematize and improve professional skills and knowledge and activate one's own experience, develop memory, thinking, imagination, and attention, develop a positive attitude towards the educational process, and form the best personal qualities of a person, personality-oriented education in higher education helps. With this approach, higher education teachers collaborate with students in creating

a developmental environment, constantly make decisions, respect their right to choose and their opinions, and help them develop skills for the success of their future lives.

When teaching students, we must imagine what teaching methods will be most effective. Teachers should remember that students want to be freer in choosing a goal, are self-sufficient, may have more prejudices and stereotypes than schoolchildren, already know how to learn, have negative or positive life and educational experience, their needs and requests are clearer, preferences and interests are more established, views are balanced and moderate. Also, the behavior of students is significantly different. It is already formed in them, and therefore, students can work more concentratedly and longer, however, if learning allows them to express their thoughts and beliefs, it has important practical significance for them (Alieksieiev et al., 2023).

Students participating in the educational process should feel the need for learning, they highly appreciate the understanding that learning will help them achieve their goals. Therefore, it is worth making flexible lesson plans.

It is important for students to feel respect for themselves. Extensive practical experience should be recognized by teachers to form the professional skills of a physical education teacher, which is associated with innovative technologies. It is such an environment that ensures the implementation of co-creation within the humanistic paradigm, promotes the self-realization of the individual the development of creative potential, and forms the student's readiness for personal self-improvement (Chendakova, 2020).

The elements of the educational and favorable environment for the formation of professional skills of a physical education teacher, which are associated with innovative technologies, are:

- **Teaching technologies, educational content** (compliance with the current needs of the labor market – the content of the educational program, competitiveness of the educational program in the labor market, the influence of stakeholders and employers on the formation of the content of the program, the use of digital, modern, educational, production technologies in the educational process, ensuring the free choice of academic disciplines by the student);
- **Favorable psychological climate** (ability to trust and mutual understanding, ability to emotional communication and communication, ability to mutual respect, ability to tact in communication);
- **Spatial environment** (internship at leading enterprises in the industry, academic mobility, the opportunity to continue studying at higher levels of education (postgraduate, master's degree), the opportunity to find employment after training, participation in professional events (conferences, seminars, master classes, exhibitions, etc.); development opportunities (convenience of the educational environment, accessibility to the educational institution, availability of relaxation areas, safety of the environment, provision of the necessary resources for productive learning) (Kovalchuk et al., 2020).

### **Innovative methods, forms, and technologies are necessary for the formation of professional skills of a physical education teacher.**

Innovations in pedagogical tools to form the professional skills of a physical education teacher include gamification, distance, information, and communication technologies; circuit training; non-standard and innovative equipment; game and plot techniques; individual, competency-based, creative, differentiated, personally oriented, and sportification approaches.

Innovative activities to form the professional skills of a physical education teacher consist in adapting to modern conditions of development of the educational environment, traditional methods, and forms of teaching, and in developing means and new goals of achievement, which are a form of effective and creative work of the individual. Modern requirements for the formation of professional skills of a physical education teacher based on modern technologies and methods of the educational process of pedagogical





education lead to constant changes in approaches to it. A systematic approach becomes relevant for the integration of the entire content of training and the activities of a future teacher.

In the context of the formation of professional skills of a physical education teacher, the most significant provisions are:

- Entering the world and European educational space of higher education;
- Establishing a humanistic, personally oriented paradigm of education;
- Concepts of pedagogical education, modern ideas of forming professional skills of a physical education teacher, where innovative technologies are of great importance, which create optimal opportunities for learning, consisting of various ways of organizing the educational process (Kotendzhy et al., 2023).

Such technologies have special methods of organizing innovative types of individual activity, containing a certain set of actions and procedures subject content, which creates innovative opportunities for the educational process and contributes to the instrumental provision of achieving results during the educational process.

Systematic training in physical education is one of the main principles of using innovative technologies to form the professional skills of a teacher. This principle requires the systematic formation of skills, abilities, knowledge, and logical connection of each element of educational material with another. Accessibility is an important principle for the formation of professional skills of a physical education teacher because the teacher must use the method of visualization to explain to the student how to correctly perform a particular exercise. For better understanding and assimilation of new material by children, the principle of awareness and activity is significant in teaching (Melynk, 2020).

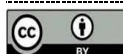
We consider the following innovative technologies to be quite effective in the process of forming the professional skills of a physical education teacher and the physical education of a person:

- Cooperative group learning is used to improve individual skills, promote the independent formation of professional skills and physical qualities of a person;
- Information technologies for learning include an interactive methodological and organizational complex that makes it possible to use non-standard sources of information (Internet sites, social networks);
- The use of multimedia technologies in physical education lessons will help increase the effectiveness of the educational process and contribute to the formation of the professional skills of a physical education teacher (Mostetska & Lavrin, 2022).

The leading innovative technology for the formation of professional skills of a physical education teacher is physical sports-oriented education, which is based on the use of all types of sports games. Circuit training is widespread during such lessons, thanks to which a person develops motivation and interest in systematic physical education classes.

Recently, new pedagogical technologies and innovative approaches have emerged for the formation of professional skills of a physical education teacher and effective training of physical education teachers, which allow them to form their professional skills and use the latest technologies in the educational process (Babchuk et al., 2023).

An important role in the preparation of future physical education teachers and the formation of their professional skills through the use of innovative technologies in their activities is the use of immersive technologies, including interactive applications, augmented reality, and virtual reality, which makes it possible to be part of certain simulations, interact with the digital environment. The use of such innovative



technologies can significantly improve the quality of teaching and ensure the professional skills of physical education teachers, as well as provide practical experience for future teachers (Kotendzhy et al., 2023).

To conduct innovative lessons to solve several educational tasks, a teacher needs creative thinking skills. The introduction of innovative technologies into the process of physical education makes it possible to achieve positive results during the joint work of students and the teacher, taking into account all the distinctive features of students. Therefore, an important aspect is professional skill, which consists of the creative application of innovative achievements in the successful mastery of the methodology of education and training (Shevchuk, 2023).

During our research, a methodology for the formation of professional skills for future physical education teachers was developed based on modern technologies and methods of the educational process. During classes, students were offered the use of:

- The method of “creative-linguistic reproduction”, where higher education applicants were given tasks to write a pedagogical essay on various professional topics.
  - The method of creating an “associative bush” to ensure interdisciplinary connections and enrich the professional dictionary with synonymous words;
  - The method of “discussion studio” to unite students into micro-groups, taking into account their learning style and personal beliefs;
  - The game method, where students developed their own portfolio, in which mobile, didactic games were concentrated for students of different age groups;
  - The method of sports relaxation, using a set of exercises of sports dance, aerobics, and dance fitness (Khoma, 2021);
  - Interactive and active methods involving the use of E-learning techniques together with direct communication during classes with a teacher in the classroom:
- 1) **Verbal** – discussion, lecture, explanation, story, instruction, instruction, reminder, prompt, listening to audio, work with open resources (blog, website), electronic manuals and textbooks, educational catalogs, real-time discussion in online chat, processing of instructional materials, etc.;
  - 2) **Practical** – exercise method: training, laboratory, and practical classes; game method (role-playing games, sports, and outdoor games); work with computer educational systems, educational programs, use of simulators and online games (stimulation, plot, role-playing); competitive method (student participation in sports competitions);
  - 3) **Visual** – illustrating statistical clarity, showing, watching videos, presentations, demonstrating the technique of performing exercises, online broadcasts (sports competitions, screencasts, video lectures), etc.;
  - 4) **Problem-search** – direct search for information in catalogs, thematic lists, directories, analysis of educational resources, solving problem situations, individual design and modeling, heuristic conversation, brainstorming, research laboratory work, searching for information using specialized programs, solving web quests, working together on an online project, case method, creating virtual didactic tasks, etc.;
  - 5) **Self-education methods** – creating reference schemes, taking notes on educational material, independent physical exercises, completing independent work tasks, participating in sports clubs, face-to-face training, sections, creating mental maps, electronic portfolios, independent searching on the Internet and processing information taking into account professional needs and personal interests, exchanging experience and participating in online professional communities, taking training and online courses, etc.;
  - 6) **Methods of self-control and monitoring of educational achievements** – observing the completion of tasks, testing, tests, written and oral surveys, checking the formation of practical skills, exams, tests, webinars, online surveys, interactive educational lectures with elements of questionnaires, formative assessment, automated test programs (Danysko & Semenovska, 2019).



## Experimental methodology

In the process of experimental research, we set the task of developing and substantiating a methodology for the formation of professional skills of future physical education teachers in higher education institutions in the process of studying professional disciplines based on modern technologies and methods of the educational process, as well as determining whether it ensures the quality of professional training, the effectiveness of training, whether it contributes to the implementation of innovative teaching technologies, the formation of professional skills of students.

Analyzing the content of the physical education teacher's activity, we focused on an important component of professional skills – his professional skills – and identified the structural components of professional skills and the features of their formation. When analyzing specific professional skills, we established a sufficient and necessary level of their development in professional and pedagogical activity, studied the levels of professional skills formation in physical education teachers with different work experiences, and analyzed the features of professional activity.

To assess the professional skills of specialists, the criteria for the formation of professional skills were taken as the initial requirements, in particular: the degree of awareness of scientific foundations and goals, the degree of generalization of skills, and the consistency, completeness, and thoroughness of the operations performed.

We have identified levels that, in CG and EG students, allowed us to conclude the degree of formation of professional skills: high, medium, low, and very low.

At the ascertaining stage of the experimental study, the formation of the components of professional skills in graduate students was studied. For this purpose, we determined the level of formation of students' professional skills, identified the need to develop the components of professional skills in future physical education teachers, and also established the degree of importance of the use of innovations in teaching professional disciplines. A questionnaire with closed-ended questions was used for this purpose and studied the respondents' self-assessment of the level of formation of professional skills of future physical education teachers. Respondents were asked to choose an answer (I don't know how, I know how, I know how well, I experience difficulties), which characterizes the level of formation of the qualities and abilities of the respondents (gnostic, organizational, constructive, design, communicative), necessary in the professional activities of physical education teachers, for their professional skills.

To identify the reasons for the insufficient formation of pedagogical skills and the formation of professional skills in the respondents, pedagogical observations were conducted during the study of professional disciplines.

During the study and discussion of the studied material, attention was paid to the activity of the respondent during the assimilation of theoretical knowledge, the ability to be guided by subjective experience, and knowledge of professional theory to solve pedagogical tasks.

A study was conducted among practicing teachers of the level of development of professional skills at the end of the ascertaining experiment to identify the reserves of the higher school educational process in terms of the formation of components of pedagogical skills and to verify the interdependence of professional skills and pedagogical experience.

Based on the ascertaining experiment (obtaining data), it was found that the training of future teachers requires the search and application of more effective teaching methods and organizational methods that lead to an increase in skills, the development of the student's personality, and not only to the assimilation of knowledge.



A formative pedagogical experiment was conducted with graduating students. Two groups: CG and EG, were formed before the start of the experiment.

A diagnosis of respondents in these groups was carried out at the beginning of the experiment, which included studying motivation for professional activity, as well as determining the level of theoretical preparedness of respondents.

A cross-section of pedagogical knowledge was conducted to identify weak links and determine the initial level of theoretical training of respondents (to use skills, knowledge, and experience when solving the tasks). To test the hypothesis about the positive dynamics of professional knowledge and skills in work, the following were used: the  $\chi^2$  criterion – to determine the independence of the EG and CG samples, calculation of the mathematical expectation and variance – to evaluate the learning outcomes.

The absence of significant differences between EG and CG students was checked using the Student's t-criterion, which involved calculating the empirical value of the t-criterion, formulating statistical hypotheses (differences between the arithmetic mean of the EG and CG success are insignificant and random – zero –  $H_0$ ; alternative  $H_1$  – differences in the EG and CG success are significant, reliable); determining the level of significance of the t-criterion to conclude on the refutation or confirmation of our assumption.

During the formative experiment, considerable attention was paid to the methodology for the formation of professional skills based on modern technologies and methods of the educational process. This allowed us to develop educational and practical tasks to determine the ways of developing professional skills that must be applied in practical classes to effectively influence the formation of elements, methods, forms, technologies, factors, and structures of the professional skills of physical education teachers.

During the formative experiment, we tested the implementation of the proposed innovations and experimentally tested the developed methodology for the formation and improvement of the level of professional skills of graduates young physical education teachers to test the effectiveness of the methodology for the formation of professional skills based on modern technologies and methods of the educational process, which contribute to the formation of professionals.

At the end of the formative experiment, the experimental data were processed and systematized, the results obtained were summarized and compared with the predicted ones, conclusions were formulated, and prospects for further research of the outlined problem were determined.

### **Analysis of the state of formation of professional skills of physical education teachers.**

To identify the current state of formation of professional skills in higher education among future physical education teachers, the degree of formation of the components of professional skills in students who graduated from university and have work experience from 1 to 5 years (20 people) was studied at the ascertaining stage of the experiment.

A survey was conducted, through which the levels of formation were analyzed, and data were obtained on the level of gnostic, organizational, design, and communication skills of students, which significantly characterize the readiness for the pedagogical activity of students.

Students have emphasized the importance of experience in their specialty pedagogical practice in general education schools during their studies at the university.

Having systematized the students' responses, the percentage ratio of each level of formation of pedagogical skills was determined.



Based on the data obtained, we claim that the majority of respondents believe that they can analyze pedagogical situations, organize collective activities of students, and establish constructive relationships with them.

Significant difficulties arise for respondents in the process of designing educational activities and forming professional skills based on modern technologies and methods of the educational process. 40% of future teachers experience difficulties in performing this activity, which indicates insufficient formation of design skills. 49% of graduates do not have gnostic skills, which are one of the fundamental ones in the process of becoming a future teacher or have weak skills in their activities.

This indicates that the current system of forming professional skills based on modern technologies and methods of the educational process and the formation of pedagogical skills of future specialists requires urgent improvement.

Therefore, in the educational process, we focused on the methodology of forming professional skills based on modern technologies and methods of the educational process, which is one of the reasons for the insufficient formation of students' pedagogical skills.

The analysis of pedagogical observations allowed us to identify the reasons for the insufficient formation of professional skills and pedagogical skills in specialists when studying professional disciplines:

- The predominant informational and reproductive nature of lectures,
- Weakly expressed, insufficient motivation of students for professional activity;
- Insufficient connection with the specifics of the future professional activity of specialists with educational material;
- Students' orientation to their thorough comprehension in the process of learning knowledge;
- Imperfection of the system of control of understanding and learning of educational material;
- Insufficient use of elements of mutual control and mutual learning and inclusion in the practical activities of students.

We believe that the basis of the application of new methods and techniques for organizing professional training and lifelong learning should be an activity-oriented and personally oriented approach, which will encourage self-development of the personality, allow the use of elements of developmental learning, increase the activity of students in independent work, and not only increase the level of knowledge acquisition.

Since the results of the ascertaining stage of the study indicate the need to find new ways to form professional skills and abilities at a higher level for future physical education teachers, we have developed a methodology for forming professional skills based on modern technologies and methods of the educational process and further testing its effectiveness.

### **Analysis of the effectiveness of the formation of pedagogical skills using the methodology for the formation of professional skills based on modern technologies and methods of the educational process in future physical education teachers.**

The purpose of the formative stage of the experiment was to check the effectiveness of the methodology for the formation of professional skills of future physical education teachers based on modern technologies and methods of the educational process.

Sixty-two students studying in the last years of higher education took part in the experiment. An EG (30 respondents) and a CG (32 respondents) were formed.



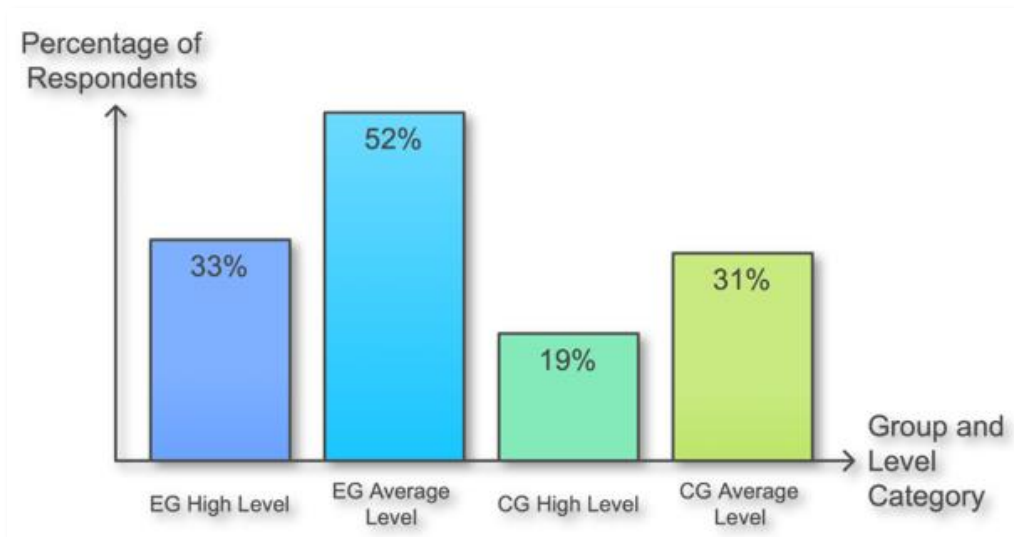


To purposefully build the further process of forming professional skills of specialists, a study of the professional activities of the respondents was conducted.

At the beginning of the study, a cross-section of pedagogical knowledge allowed us to obtain the level of theoretical training of the respondents. It was determined using the  $\chi^2$  criterion that the formed groups, with a probability of 0.99 ( $\alpha < 0.01$ ), are homogeneous. Analyzing the correctness of the respondent's answers, we identified weaknesses that need to be paid attention to in the process of forming pedagogical skills. During the observation of the student's work, we identified their levels of preparation – low, very low, high, and medium.

After experimenting (implementation of the methodology developed by us for the formation of professional skills based on modern technologies and methods of the educational process), based on the analysis of the tasks performed by the students, we saw positive changes in the CG and the EG (improvements were recorded in mastering the theory of education and training in the ability to creatively use their knowledge during practical work). However, a significantly larger number of respondents in the experimental group were at qualitatively higher levels (Fig. 1):

EG – 33% of respondents were at a high level and 52% – at an average level;  
CG – 19% of respondents were at a high level and 31% – at an average level).



**Figure 1.** Comparison of Respondent Levels in Groups.

EG students (according to our observations) expressed creative ideas in solving the tasks, more often showed independence, thought outside the box, and demonstrated the formation of professional thinking.

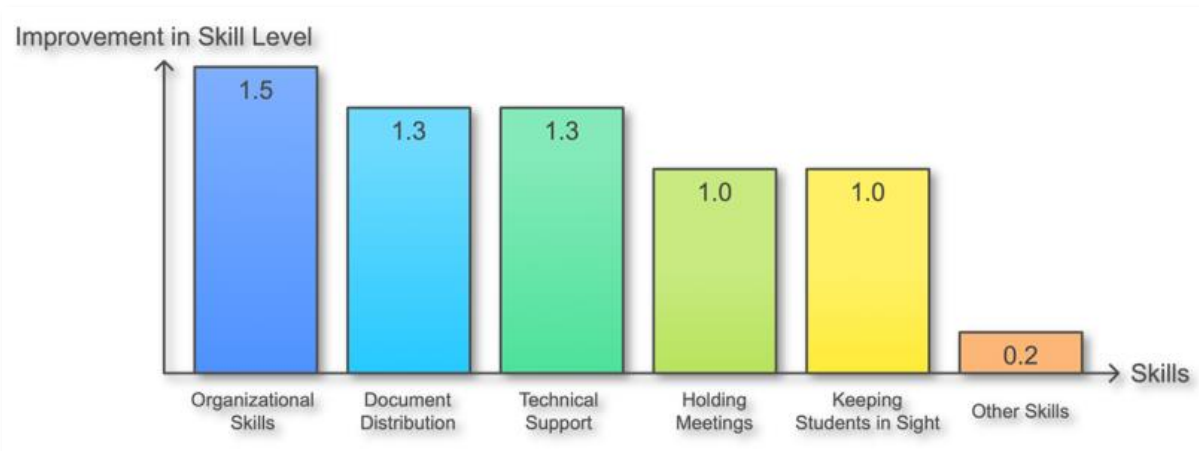
We were also interested in how EG and CG students during the experiment would apply the skills and theoretical knowledge gained in practical classes, use their subjective initial experience, solve pedagogical tasks during physical education lessons in real practical activities, during the organization of sports and mass work with students, and conducting educational activities in general education institutions.

Based on the assessment of the student's abilities to conduct physical education and sports and mass work, physical education lessons, perform pedagogical observations in lessons, and maintain methodological documentation, a general assessment of the activities of the CG and EG in pedagogical practice at school was obtained. Data analysis showed that the level of development of practical skills and pedagogical skills in EG students is higher than in CG students.

EG students showed the ability to deeply understand the organization of educational work, implement innovative methods and techniques of upbringing and teaching, the regularities of the learning process, realize their capabilities in practical pedagogical activity, and implement them.

Analyzing the dynamics of the development of professional skills and professional-pedagogical skills based on modern technologies and methods of the educational process in EG students, we note that the increase in indicators by skill groups occurs unevenly.

After using our methodology for the formation of professional skills based on modern technologies and methods of the educational process, the highest dynamics of the results of EG students are organizational skills (organization of conducting, closing, and opening competitions) and skills that increased by 1.5 points; the ability to organize the distribution of documents – by 1.3 points; the ability to create technical support for training sessions – by 1.3 points; the ability to hold meetings – by 1.0 points; the ability to keep students in sight – by 1.0 points. The results of other skills increased (from 0.6 to 0.8 points) (Fig. 2).



**Figure 2.** Improvement in Student Organizational Skills.

In EG, the gnostic skills of respondents generally have positive dynamics. The ability to identify the effectiveness of planned methods and means received the highest results (+0.98), and we also see significant results in the ability to anticipate difficulties (+0.82). And the ability to create stimulating situations (+0.41) and the ability to use traditions (+0.42) have the lowest growth rates. The remaining skills of this group increased from 0.50 to 0.59 points.

In the EG, the constructive skills of respondents increased the most in the following indicators – time allocation in the lesson (+0.86) and managing the placement of students in the gym (+0.94). Other indicators increased from 0.35 to 0.54 points.

In the EG, communicative skills improved slightly (this is because, before the experiment, these skills had the highest indicators) – in the range from 0.10 to 0.40.

In the EG, design skills show the greatest increase in skills: the ability to conduct briefings (+0.83), the ability to organize independent and individual activities of students (+0.86), the ability to provide an innovative level of modern educational and training process (+0.99). The lowest indicator (+0.24) is the creation of conditions throughout life for the successful continuation of education. The growth of indicators for the remaining skills was found in the range of 0.44 – 0.66 points.

The obtained data indicate positive changes in the educational process of future physical education teachers thanks to the methodology for the formation of professional skills based on modern technologies and methods of the educational process.

We observe in the EG the highest results of the growth of organizational, gnostic, and constructive design skills. And in general, we observe positive dynamics in all groups of skills.

When comparing mathematical calculations of the studied samples – the calculation of the Student's t-test showed a significant difference ( $t = -4.52$  with statistical significance  $p = 0.01$ ) between the CG and the EG. That is, the level of training of CG students differs from the level of EG with the necessary statistical reliability.

The presented results of the level of formation of professional skills based on modern technologies and methods of the educational process, the development of components of professional skills in EK and CG students show a significant increase in results for most components of pedagogical activity in EG. In CG, the results did not increase significantly (a significant increase in the level of professional skills based on modern technologies and methods of the educational process, professional skills are not observed for any indicator, although a tendency to increase in indicators is noted. This indicates that the methodology used for the formation of professional skills based on modern technologies and methods of the educational process is significant and necessary for its implementation in higher education institutions.

## Conclusions

The content of the research concepts is analyzed; the elements, qualities, structure, and factors of the professional skills of a physical education teacher, which are associated with innovative technologies, are considered; the organization of an innovative educational process based on modern technologies and methods of the educational process is described; effective, innovative methods, forms and technologies necessary for the formation of the professional skills of a physical education teacher are analyzed.

In the process of the experimental study, we set the task – to develop and substantiate a methodology for the formation of professional skills of future physical education teachers in higher education institutions in the process of studying professional disciplines based on modern technologies and methods of the educational process, and also to determine whether it ensures the quality of professional training, the effectiveness of teaching, whether it contributes to the implementation of innovative teaching technologies, the formation of professional skills of students.

At the ascertaining stage of the experimental study, the formation of the components of professional skills in graduate students was studied. Based on the ascertaining experiment (obtaining data), it was found that the training of future teachers requires the search and application of more effective teaching methods and organizational methods that lead to an increase in skills, the development of the student's personality, and not only to the assimilation of knowledge.

The formative experiment was conducted with graduating students. Two groups: CG and EG, were formed before the beginning of the experiment.

To test the hypothesis about the positive dynamics of professional knowledge and skills in work, the following were used: the  $\chi^2$  criterion – to determine the independence of the EG and CG samples, calculation of the mathematical expectation and variance – to evaluate the learning outcomes.

During the formative experiment, considerable attention was paid to the methodology for the formation of professional skills based on modern technologies and methods of the educational process. At the end of the formative experiment, the experimental data were processed and systematized, the results obtained were summarized and compared with the predicted ones, conclusions were formulated, and prospects for further research of the outlined problem were determined. The data obtained indicate positive changes in

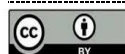


the educational process of future physical education teachers thanks to the methodology of forming professional skills based on modern technologies and methods of the educational process. We observe in EG the highest results of the growth of organizational, gnostic, and constructive design skills. And in general, we observe positive dynamics in all groups of skills.

We see prospects for further scientific research in the study of innovative approaches to organizing the independent work of students.

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