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ПРИНЦИПИ РЕАЛІЗАЦІЇ ТЕХНОЛОГІЙ РОЗВИТКУ ПРОФЕСІЙНОЇ КОМПЕТЕНТНОСТІ ПЕДАГОГІЧНИХ ПРАЦІВНИКІВ ФАХОВИХ КОЛЕДЖІВ

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Анотація. На основі аналізу сучасних підходів до реалізації педагогічних технологій, урахування методологічних основ професійного розвитку викладачів фахових коледжів та досвіду впровадження освітніх інновацій у закладах фахової передвищої освіти виокремлено та обґрунтовано принципи реалізації технологій розвитку професійної компетентності викладачів фахових коледжів. Наголошено на тому, що реалізація зазначених принципів сприяє ефективності розвитку професійної компетентності педагогів, їхньої адаптації до сучасних викликів та впровадженню педагогічних інновацій у навчальний процес.

Ключові слова: фахова передвища освіта, педагогічна технологія, професійний розвиток педагога, принципи, педагогічні інновації.

PRINCIPLES FOR IMPLEMENTATION OF TECHNOLOGIES FOR THE DEVELOPMENT OF COLLEGE TEACHERS' PROFESSIONAL COMPETENCE

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Abstract. Based on the analysis of current approaches to the implementation of educational technologies, taking into account the methodological foundations for the professional development of college teachers and the experience of implementing educational innovations in institutions of professional pre-higher education, the principles of implementing technologies for the development of college teachers' professional competence were identified and substantiated. It was emphasized that implementing those principles contributed to the teachers' professional development effectiveness, their adaptation to current challenges and the introduction of teaching innovations into the educational process.

Keywords: professional pre-higher education, educational technology, teacher's professional development, principles, teaching innovations.

Continuous professional growth of teaching staff is one of the determining factors in the effective modernization of professional pre-higher education. In the context of ongoing educational reforms and global challenges, the role of teaching staff as agents of educational change is steadily growing. Following the Laws of Ukraine "On Education" and "On Professional Development," teaching staff involved in the educational process are required to systematically enhance their competencies, improve professional qualifications, and master innovative teaching methods, forms, and tools. This requires the integration of mechanisms and tools across all forms of education, formal, non-formal, and informal education, which could ensure that teachers have access to diverse pathways for professional development. Thus, modern educational practice must systematically engage the resources of postgraduate education institutions, the methodological services of colleges themselves, and, no less importantly, self-education and self-improvement strategies by teachers in the process of their professional growth (Titova, et al., 2024).

Within this context, the technologization of the process of the college teacher's professional competence development becomes a key approach. It is based on the idea that education should be transformed into a purposeful, structured process involving the active participation of all stakeholders (Sysoieva, 2001). Educational technologization emphasizes predictability, reproducibility, and a guarantee of results through the structured implementation of pedagogical strategies and tools. As noted by Prokopenko and Yevdokimov (1995, p. 11), the learning process must be oriented towards the "guaranteed achievement of educational outcomes," which presupposes a systematic sequence of stages, goal-oriented activity, and methodological consistency in educational interventions. In this context, educational technologies are not only tools for content delivery but also comprehensive systems that ensure the quality and effectiveness of teacher training and continuous professional development.

Current trends in teacher professional development point to the increasing role of educational technologies that are structured, results-oriented, and adaptable to diverse learning contexts. Particularly in colleges, which function under dynamic social and economic conditions, there is a need to implement innovative approaches that foster the sustainable development of professional competence among educators (Titova, et al., 2023). The importance of providing a technological approach in the process of college teacher professional development is rooted in the requirement for measurable, consistent and efficient professional development trajectories. This includes applying such educational technologies in the professional and personal development of teachers that are characterized by procedural clarity, consistency of implementation and a focus on outcomes.

Moreover, educational technologies suitable for college teachers' professional development must integrate adult learning principles, be sensitive to their professional realities and promote active involvement in constructing their learning

paths. This necessitates defining a set of core principles that should guide the implementation of technologies for teachers' professional competence development. These principles should ensure alignment with educational policy, respond to institutional and individual needs, and enable college teachers to integrate new knowledge and skills into their everyday pedagogical practices. Therefore, the current research aimed to identify and substantiate the principles for the implementation of technologies for the development of college teachers' professional competence as a necessary step in creating an effective methodological foundation for the up-to-date teacher's professional development within the system of professional pre-higher education.

In the Ukrainian scientific and pedagogical field, a significant contribution to the study of the problem of technological approach in the educational process was made by such well-known scientists as A. Aleksiuk, M. Artiushyna, A. Asherov, S. Goncharenko, V. Yevdokimov, O. Kovalenko, A. Nisimchuk, M. Nosko, O. Padalka, O. Pehota, I. Prokopenko, L. Romanyshyna, G. Romanova, Ya. Rudyk, S. Sysoeva, M. Chepil, M. Fitsula, D. Chernilevsky, O. Shpak and others. To create a definition of the concept of "the technology for the development of the college teachers' professional competence", it is first worth stating that per se it is the educational technology. Therefore, it is necessary to start with the examination of this generic concept. First of all, we should note that few works highlight the theoretical foundations of educational technology. They all state that educational technology refers to the structured application of technological tools and processes within instructional settings to enhance learner outcomes. It involves a systematic approach to identifying learners' needs, integrating technology into instruction and monitoring educational progress.

Educational technology also supports differentiated instruction by offering self-paced materials that cater to both advanced and struggling students. As emphasized by Galbraith (1967), technology in education must adhere to two essential features: the systematic application of scientific knowledge and the division of tasks into functional components.

In this respect, Nosko, Harkusha, & Tsyhura, (2023) proposed a thorough definition, which could be considered in the current research. The authors, based on the generalization of the scientific approaches to the interpretation of the term *educational technology*, reveal the structure and content of the concept distinguishing four dimensions – scientific, procedural-actional, procedural-descriptive and systemic – which should be considered for the term. Moreover, we accept the authors' conclusion that educational technology should be considered broadly, both as a new branch of pedagogy as a model of the real educational process, and as a pedagogical system.

Similar ideas could be traced in the research of Loboda (2023), which also focuses on four separate definitions of educational technology. One of the first definitions (perhaps therefore rather narrow, in our opinion) is given by UNESCO (ICSU Committee on Science Education, 1974): "a systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of

specific objectives and employing a combination of human and technical resources to bring about more effective instruction."

To appeal to the root of the key principles for the implementation of technologies for the development of college teachers' professional competence the analysis of the main (generic) features, which the scientists used to define the phenomenon, was made. Therefore, educational technology is defined as: the science of development, learning and upbringing of the individual (Nisimchuk, Padalka & Shpak, 2000); a pedagogical system in which the use of teaching aids increases the effectiveness of the educational process (Prokopenko & Yevdokimov, 1995); a new branch of pedagogical knowledge; a real educational process built on a certain technology in order to achieve pre-planned goals; a model (algorithm, construction, strategy, etc.) of the educational process, developed in accordance with the basic provisions of the technological approach (Nosko, Harkusha & Tsyhura, 2023); the process of developing and implementing a pedagogical project in an educational institution that reflects a certain system of pedagogical views (Sysoieva, 2001); a complex integrative system that contains an ordered series of operations and actions that provide pedagogical definition, content, information-subject and procedural aspects aimed at the assimilation of systematized knowledge, acquisition of professional skills and formation of personal qualities of students, given the purpose of learning (Chernilevskyi, Dzhedzhula, & Hunko, 2013); an algorithm of joint actions carried out by teachers and students, which are systematically diagnosed and aimed at ensuring that the result corresponds to the defined goal (Mykhailichenko & Rudyk, 2016), etc.

Any scientifically based technology has a number of characteristic features. In particular, it involves dividing the process into interconnected stages, coordinated and consistent execution of actions to achieve a specific goal and obtain expected results. An important condition for the effectiveness of the technology is the clarity and unambiguity of all envisaged procedures and operations. In addition, it must ensure the possibility of multiple reproduction of the process with stable results (Morska, 2008, p. 10).

Therefore, technology is the sequential execution of pre-designed technological operations with the aim of guaranteed obtaining a specific product (Luzan, 2021).

According to Morel & Spector (2022) the process of educational technology can be delineated into three stages. According to Galbraith (1967) there are two main characteristics of every technology: the systematic application of scientific knowledge to practical tasks and the breakdown of these practical tasks into sections and sub-sections. The second characteristic involves selecting or designing the optimal plan for teaching students, enabling them to meet the teaching objectives. After that, it is necessary to evaluate the learner's performance to determine whether the educational objectives have been met. If the objectives are not achieved, there is a need to modify the teaching strategy or strategies in a way that ensures the teaching objectives are accomplished. Therefore, the process of educational technology can be divided into three distinct stages:

1. Analysis of instructional components means identifying and examining the elements to be utilized as inputs in the teaching-learning process.

2. Organization and implementation require arranging and applying these components effectively during instruction.

3. Evaluation and feedback include assessing learner outcomes to determine if educational objectives are met. If not, instructional strategies are revised to achieve the desired goals.

This cyclical process ensures continuous improvement in educational practices. However, a real attempt to technologize the process of mastering knowledge and skills was programmed learning (ICSU Committee on Science Education, 1974) with certain characteristic features:

– division of the process into interconnected stages;

– coordinated and phased implementation of actions aimed at achieving the set goal and obtaining the corresponding results;

– unambiguous implementation of procedures and operations included in the technology, which is a crucial condition for achieving results;

– repeatability and reproducibility of the process of obtaining the product.

In Ukraine, elements of programmed learning began to be used in the 1920s, when scientists substantiated the scientific method of labour pedagogy, which was based on special programs. According to these programs, the entire volume of work was divided into certain operations, the duration of their execution was indicated and continuous control (constant feedback) was provided. The following features of programmed learning (Luzan, Ilyin, Ishchenko, & Pastushenko, 2005):

– educational material is presented to students in small parts;

– each part (portion) of educational material is accompanied by instructions or tasks to perform certain actions aimed at its assimilation;

– the assimilation of each portion of the educational material is checked using a special control task;

– after completing each control task, the student immediately finds out whether he answered correctly or incorrectly (feedback);

– depending on the student’s answer, the possibility of his further advancement is determined;

– each student works independently and masters the educational material at a pace that is feasible for him;

– the results of all control tasks are recorded, they become known to both the students themselves and the teacher;

– the teacher organizes training, provides assistance and consultations in case of difficulties for students and implements an individual approach;

– specific means are used in the educational process - programmable teaching aids, simulators, computers, etc.

We should agree with the scientists that precisely those features of the technology liken learning to a production and technological process. Focusing on the above features, features and characteristics of the phenomenon under study, we will try to identify the principles of implementing technologies for the development

of college teachers' professional competence. From the above considerations, we should clarify the essence of the concept of *technology for the development of college teachers' professional competence* in the following aspects:

– it is a special organization for the development of college teachers' professional competence;

– with a technological approach, the process of the college teachers' professional development should be clearly aimed at achieving the set goals;

– to implement the technology for the development of college teachers' professional competence, it is necessary to develop a project in advance, on a scientific basis;

– the project should reflect the technology for the development of college teachers' professional competence as a system with detailed components, stages, procedures, etc.;

– we must take into account that guaranteed achievement of learning outcomes can be made by combining the mechanisms of formal, non-formal and informal teachers' education into a single system.

Most scientists who study the problem of technological learning clearly emphasize that the orientation of educational goals, and with them the entire course of learning, to the guaranteed achievement of results, is the leading feature of educational technology. In addition, educational technology should provide for the formulation of goals through learning outcomes, which are expressed in the actions of the student, constantly checked for correction of both the methodology and the results themselves. Therefore, the next essential feature of educational technology is the specificity of educational goals.

Naturally, educational technology should be created on the ideas of reproducibility: every mentor or instructor should be able to apply it effectively. Given this, an essential feature of educational technology is specifically written clear procedural characteristics, the application of which guarantees the achievement of results. So, on a scientific basis, it is first necessary to develop a project for such an organization of the educational process, which provides for clear and consistent implementation of certain educational actions in conditions of operational feedback. And if such a project is developed, then educational technology can be replicated, transferred to other conditions, reproduced, etc.

However, it is worth saying that the achievement of educational results primarily depends not only on the quality of the didactic project, the detailing of educational tasks, operational feedback, or technical means of teaching but also on the mentor's skill in creating personal and developmental situations. In confirmation of this, we emphasize that the educational process is a pedagogical interaction between mentors and teachers, aimed at achieving the set goals. Pedagogical interaction is unique: its content and methods are determined by the tasks of teaching, upbringing and development of the personality of students. Undoubtedly, this position should also be taken into account in defining the category under study.

The principles for the efficient implementation of educational technology serve as foundational ideas and initial provisions that determine the content, forms,

and methods of organizing the educational process in alignment with the established goals. These principles must take into account the regularities of the learning process and play a regulatory role in the educational system. They are formulated based on an analysis of the corresponding patterns. The accuracy of modelling didactic theories and methods for regulating the practice of learning is ensured by adhering to the principles of the technological approach in education, which are grounded in theoretical foundations. The main sources for deriving such a system of principles include the experience of organizing educational activities, the theory of cognition, the functioning of the human psyche, and the regularities of the didactic process, among others. The teaching and upbringing principles developed within scientific and pedagogical theory form the basis for developing a system of professional methods. In this context, didactic principles are specified during the process of studying specific subjects, considering their particular characteristics. This specification is a necessary and natural occurrence when transferring general scientific knowledge into specific, typical, or exceptional situations. General didactic principles are initial recommendations for selecting methods to achieve learning objectives, and these recommendations mainly address the regulation of interpersonal relationships among the participants in the educational process. They also focus on organizing favourable conditions for achieving educational goals, without highlighting special additional conditions for fulfilling individual educational and developmental objectives. A complete and logically structured set of principles for organizing the educational process ensures that the process is scientific, consistent, systematic, and, therefore, effective.

The system of principles governing the functioning of educational technologies is rooted both in the patterns of organizing the pedagogical process and in the diagnostically defined goals of educational technology. When introducing a new educational technology into the pedagogical process, the goals of its organization are clarified. The identified goal determines an appropriate method to achieve it, which may be based on a system of original patterns and principles. A thorough understanding of the multifaceted goals of teaching and education has led to the selection, based on the analysis of natural relationships among the elements of the pedagogical system, of the system of principles for the functioning of educational technology.

The system of principles for the functioning of the pedagogical system (or educational technology efficient realization) does not negate the well-established didactic and educational principles in pedagogy. Instead, it requires a detailed study and adherence to these principles to ensure a high-quality organization of the educational process using educational technologies.

The system of principles for the functioning of educational technology includes the following: *The principle of integrity; The principle of diagnostic purposefulness; The principle of completeness; The principle of intensity in constructing the educational process; The principle of correspondence; The principle of correspondence with nature; The principle of professional and ethical correspondence; The principle of modernity; The principle of optimization of the educational process.*

When introducing an individual author's educational technologies, this system of principles should be comprehensively considered. Ignoring any of these principles may fail to achieve the diagnostically defined goal.

The role of technology in learning encompasses not only the tools, such as hardware, software, networks, and web applications, but also the processes, including methods and strategies used for instruction, assessment, and tracking student learning (TeachOnline, 2020). Technology, in this context, refers to the various ways educational organizations employ these tools and processes, including learning management systems, to enhance and manage the educational experience. The authors offered the following principles as a guide to help reflect on the purpose and application of technology in learning, although it is important to note that these principles are far from exhaustive: *Adding value* (educational technology should enhance the learning experience by adding value, improving the quality and effectiveness of educational practices); *A pedagogical focus* (the integration of educational technology must be driven by pedagogical goals, ensuring that it is used to support teaching and learning processes effectively); *Quality* (educational technology used must contribute to maintaining or improving the quality of learning outcomes, offering tools and resources that facilitate deeper learning and understanding); *Sustainability* (the adoption of educational technology should be sustainable over time, both financially and in terms of its integration into the educational ecosystem, ensuring that it continues to provide long-term benefits); *Access* (educational technology should increase access to education, providing opportunities for learners to engage with materials, instructors, and peers, regardless of their location or background); *Scalability* (applied educational technology should be scalable, able to accommodate the growing demands of education and adapt to different class sizes, learning environments, and institutional needs); *Sharing* (educational technology fosters collaboration and sharing among students, teachers, and educational institutions, supporting the exchange of ideas, resources, and experiences); *Choice* (learners should be given the opportunity to choose how they engage with educational technology and the learning content, allowing for personalized and flexible learning experiences); *Continuous, lifelong learning* (educational technology should be integrated into a lifelong learning framework, supporting learners in their educational journeys beyond formal schooling and throughout their careers); *Customization* (educational technology enables the customization of learning experiences, allowing for tailored approaches that meet the individual needs and preferences of students, enhancing engagement and effectiveness).

The principles for the implementation of educational technologies aimed at developing college teachers' professional competence should reflect both the unique needs of educators and the broader goals of educational improvement. These principles are based on current pedagogical frameworks, advanced technologies, and an understanding of the dynamic nature of professional growth in teaching. Here are ten essential principles that can guide the implementation of educational technologies for developing the professional competence of college teachers:

1. The principle of professional orientation. The professional development of college teachers must align with the specific demands of their teaching environment. Technologies used in this context should support not only the enhancement of teaching skills but also foster a deeper understanding of contemporary educational requirements. By focusing on both pedagogical reflection and innovation, these technologies enable teachers to adapt to evolving educational standards.

2. The principle of interactivity and cooperation. Interactive teaching methods are crucial for fostering collaboration among educators. Technologies that promote joint problem-solving, group discussions, case methods, and mentorship can help create a professional community at a college. This cooperation improves the sharing of knowledge and enhances the effectiveness of the learning process.

3. The principle of continuity of professional development. Given the rapid pace of change in educational methods and tools, continuous professional development is essential. Technologies that support a systematic, phased approach to professional training allow college teachers to keep up-to-date with new challenges, standards, and pedagogical innovations, thereby enhancing their overall competence.

4. The principle of individualization and differentiation. Teachers come from diverse backgrounds, with varying levels of experience and professional needs. Educational technologies that enable personalized learning trajectories, modular learning systems, and adaptive approaches can address these individual differences, ensuring that each teacher's development is both relevant and effective.

5. The principle of reflective self-regulation. Self-reflection is a critical skill for professional growth. By incorporating such instruments as e-portfolios, self-assessments, peer-assessments and reflective journals, college teachers can monitor and analyse their own teaching practices, identifying areas of strength and opportunities for improvement. This principle promotes a conscious approach to developing teaching competencies.

6. The principle of practical significance. The professional development process should prioritize the practical application of pedagogical knowledge and skills in the educational process at a college. Technologies that simulate real classroom scenarios, encourage problem-solving through case studies and integrate new teaching methods into everyday practices ensure that learning is meaningful and directly applicable to teachers' roles.

7. The principle of technological integration. Advanced educational technologies, which use digital platforms, adaptive learning systems, simulation modelling and distance learning courses, can significantly enhance the effectiveness and accessibility of professional development for college teachers, particularly under specific conditions (pandemic, wartime, unstable educational environment, etc.). Incorporating these tools into the training process ensures that college teachers develop the necessary skills to use technology effectively in their classrooms.

8. The principle of openness to innovation. A commitment to innovation is vital for college teachers' continued professional development. Exposure to new educational technologies, research, and international teaching practices helps

teachers stay current with educational trends and challenges as well as advances in their subject domains. This principle encourages educators to remain open to new ideas and methods that can improve their professional practices.

9. The principle of forms and means diversity. Using a variety of learning formats (such as workshops, online courses, internships, and seminars) and resources (including digital tools, simulations and learning platforms) ensures that college teachers have diverse development opportunities. This approach increases accessibility, engagement and effectiveness of the professional development process.

10. The principle of positive reinforcement and creation of success. A motivating environment, where college teachers feel supported and recognize their professional growth, is crucial for continuous development. Educational technologies that emphasize successes, encourage active participation in professional communities, and create opportunities for teachers to feel accomplished are key to fostering motivation and a commitment to lifelong learning.

These principles, when integrated into the design and implementation of educational technologies, provide a structured yet flexible framework for enhancing the professional competence of college teachers. Each principle supports a holistic approach to teacher development, emphasizing the need for individualization, interactivity, and the practical application of learned skills. This comprehensive model will help ensure that teachers not only improve their competencies but are also equipped to adapt to the evolving demands of the educational landscape. Self-instructional materials provided through educational technology enable both advanced and struggling students to learn at their own pace, accommodating individual learning speeds and styles.

Conclusions. The integration of educational technologies into the professional development of college teachers represented a strategic response to contemporary educational demands and reforms. Grounded in the theoretical foundations of pedagogical technologization, the identified principles consider such specific of a college teacher's professional development as professional orientation, interactivity, continuity, individualization, reflective self-regulation, technological integration, etc., which offer a comprehensive framework for fostering educators' professional competence. These principles were designed to ensure that technologies support structured, goal-oriented, and diagnostically effective learning (teachers' professional development) processes while remaining adaptable to the diverse needs and contexts of college teaching.

The outlined approach emphasized that educational technologies did not have only to facilitate knowledge acquisition but also promote pedagogical innovation, self-directed growth, and collaborative learning cultures. Furthermore, attention to ethical considerations, inclusivity, and the relevance of practical application ensures that the development process aligns with both institutional goals and individual teaching realities.

Future research should explore empirical validation of the proposed principles in diverse college environments, assess the long-term impact of specific technologies on teacher performance and student outcomes and investigate strategies

for overcoming implementation challenges. Comparative studies across international contexts could also contribute to a deeper understanding of global best practices in technology-enhanced professional development for college educators.

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