



ПЕДАГОГІЧНА АКАДЕМІЯ:
НАУКОВІ ЗАПИСКИ

ТЕОРІЯ І МЕТОДИКА ПРОФЕСІЙНОЇ ОСВІТИ

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Modernization of the content, forms and types of professional development of Ukrainian teachers of natural and mathematical subjects, taking into account the Polish experience

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Abstract. *The article examines the peculiarities of the organization of the educational process in the systems of teacher training in postgraduate education in Ukraine and the Republic of Poland. The **purpose** is to determine the directions of using constructive ideas of the Polish experience regarding the modernization of the content, forms and types of professional development of Ukrainian teachers. The main **research methods** are analysis of scientific sources and government documents, systematization of data, generalization of pedagogical experience on the investigated problem; observation, comparison, analysis of the obtained results. In the results of the study, the definition of the concept of “improvement of the qualifications of teachers” in the educational space of Ukraine and Poland, as well as in state*



documents on the organization of professional improvement of qualifications, was analyzed; the content, forms and types of improvement of the qualifications of teachers in these two countries were considered; recommendations were provided regarding the organization of professional development and upgrading of Ukrainian teachers' qualifications taking into account the Polish experience. The study emphasizes the importance of international requirements in the matters of teacher training in the postgraduate period, along with the importance of preserving national traditions concerning the organization of Ukrainian teachers' training and the use of constructive ideas and best practices that are characteristic of the Polish system of professional development of teachers. The research material can be the basis for further scientific investigations related to the development of the postgraduate pedagogical education system of Ukraine.

*The **conclusions** draw attention to the need for changes in the organization of professional development of Ukrainian teachers at the regional and intra-school levels. Since European integration processes are gaining importance in the professional improvement of Ukrainian teachers, it is important to determine the directions of using constructive ideas of the Polish experience. Further scientific research regarding the study of the peculiarities of the organization of professional development of teachers in other European countries is considered relevant.*

Keywords: *organization of the educational process; professional development of teachers; postgraduate pedagogical education; Ukraine; Republic of Poland.*

**Модернізація змісту, форм і видів підвищення кваліфікації
українських учителів природничо-математичних предметів з урахуванням
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Анотація: У статті досліджено особливості організації освітнього процесу в системах підвищення кваліфікації вчителів у післядипломній освіті України та Республіки Польща. **Мета** полягає у визначенні напрямів використання конструктивних ідей польського досвіду щодо модернізації змісту, форм і видів підвищення кваліфікації українських вчителів. Основні **методи** дослідження – аналіз наукових джерел й державних документів, систематизація даних, узагальнення педагогічного досвіду на досліджувану проблему; спостереження, порівняння, аналіз отриманих результатів. У **результатах** дослідження проаналізовано визначення поняття “підвищення кваліфікації вчителів” в освітньому просторі України й Польщі, а також у державних документах з питань організації підвищення кваліфікації фахівців, розглянуто зміст, форми і види підвищення кваліфікації вчителів у цих двох країнах, надано рекомендації щодо організації професійного розвитку і підвищення кваліфікації українських вчителів з урахуванням польського досвіду. Дослідження підкреслює значення міжнародних вимог у питаннях підвищення кваліфікації вчителів у післядипломний період, важливість збереження національних традицій щодо організації підвищення кваліфікації українських учителів та використання конструктивних ідей і кращих практик, які характерні для польської системи професійного вдосконалення вчителів. Матеріал дослідження може бути основою подальших наукових розвідок,



ПЕДАГОГІЧНА АКАДЕМІЯ: НАУКОВІ ЗАПИСКИ

пов'язаних із розвитком системи післядипломної педагогічної освіти України.

У висновках звернено увагу на необхідність проведення змін в організації підвищення кваліфікації українських вчителів на регіональному та внутрішньо-шкільному рівнях. Значення набувають євроінтеграційні процеси у професійному вдосконаленні українських учителів, важливим є визначення напрямів використання конструктивних ідей польського досвіду. Актуальними вбачаються подальші наукові пошуки щодо вивчення особливостей організації підвищення кваліфікації вчителів інших європейських країн.

Ключові слова: *організація освітнього процесу; підвищення кваліфікації вчителів; післядипломна педагогічна освіта; Україна; Республіка Польща.*

A general statement of the problem and its connection with important scientific or practical tasks (Introduction). Today in Ukraine, significant changes continue to occur in the system of teacher training in postgraduate education of the country, the most important goal of which is to support the reform of general secondary education “New Ukrainian School” and prepare specialists for its implementation. Updating educational programs, creating integrated courses, including those of an interdisciplinary nature, implementing active learning methods, using modern pedagogical and digital technologies in the educational process are an incomplete list of issues faced by a teacher in preparing for a modern lesson. Therefore, the organization of the educational process in postgraduate pedagogical education institutions needs improvement, in particular updating the content, forms and types of advanced training in postgraduate pedagogical education of the country.

Studying and summarizing Ukrainian educational traditions and rethinking and taking into account the constructive ideas of foreign experience are important in terms of the modernization of the teacher training system. Thus, the Concept of implementation of the state policy in the field of the “New Ukrainian School” general



secondary education reform for the period until 2029 (with changes, 2018) [7] refers to the countries of Eastern Europe, in particular the Republic of Poland, whose experience shows the significant impact of educational reforms on the development of the economy and the country's competitiveness at the international level.

Analysis of recent research and publications. A significant number of scientific works are devoted to the issues of the organization of teacher training in postgraduate pedagogical education in Ukraine. In particular, V. Burenko [1] considers the application of the andragogic approach to the professional retraining of humanitarian teachers. The scientist highlights the peculiarities of the organization of the educational process at the faculties of postgraduate education, under the condition of the implementation of andragogic principles – orientation to the practical needs of the teacher, as well as solving important professional problems.

V. Kirman [3] studies approaches to the formation of the content of the professional component of postgraduate education courses for teachers of natural and mathematical disciplines. The conclusions obtained by the researcher can be used to build a multi-component model of the content of the training course for teachers of natural and mathematical subjects, which actualizes the issue of innovative and traditional learning technologies. P. Chukhnenko [8] analyzes the peculiarities of the training of teachers in the field of science education for teaching in the conditions of the implementation of the New Ukrainian School reform.

M. Marienko [4] analyzes the organization and practical implementation of training and professional development of teachers using cloud-based open science systems. The scientist examines the main areas of pedagogical training of teachers in Western European countries, in particular a combination of special, general education, psychological-pedagogical and practical training in the aspect of using cloud-oriented systems in scientific education of a teacher.

Y. Hryschuk [2] investigates the development of pedagogical education in



accordance with the requirements of the European educational space, which is of great importance for the reform of the educational sector in Ukraine, the training of pedagogical personnel, and the implementation of the “New Ukrainian School” concept. As the researcher notes: “It is of great interest the experience of the development of pedagogical education in the Republic of Poland, which has gone from a post-socialist state to a member of the European Union and is close to Ukraine in its history and culture” [2].

Highlighting previously unresolved parts of the overall problem. Despite the considerable number of scientific works devoted to the organization of teacher training in postgraduate pedagogical education of Ukraine, there remain a number of unresolved issues, among which the solution of the objective need to update the content, forms and types of training of Ukrainian teachers in the post-diploma period is of particular importance.

Furthermore, in terms of European integration vectors of the development of Ukrainian education, the constructive ideas of the European experience of improving the qualifications of teachers are not sufficiently taken into account, the directions of its introduction into the Ukrainian system of improving the qualifications of teachers are not considered enough, and recommendations for the organization of professional development of Ukrainian specialists are not sufficiently developed.

The solution of these issues is important for the realization of the goals of modernization of teacher training in postgraduate pedagogical education of Ukraine, as well as the successful promotion of the “New Ukrainian School” general secondary education reform.

Formulation of the article goals (setting the task). The article is focused on the issues of the organization of advanced training of teachers in post-diploma pedagogical education of Ukraine and the Republic of Poland.

Consequently the goals of the article are:



- to analyze the difference in the definition of the concept of “improvement of teachers’ qualifications” in the Ukrainian and Polish educational space;
- to examine the state documents of Ukraine and Poland regarding the specifics of the organization of teacher training in postgraduate pedagogical education in these countries;
- to consider the issue of choosing the content, forms and types of teacher training in postgraduate pedagogical education in Ukraine and Poland;
- to develop recommendations for updating the content, forms and types of professional development of Ukrainian specialists;
- to improve the content and technology content of educational programs of advanced training courses for teachers of natural and mathematical subjects.

Presentation of the main material of the study with a full justification of the obtained scientific results (Results of the study). The main goal of the system of advanced training of teachers in postgraduate pedagogical education of the country is to provide conditions for their continuous professional development and self-improvement. Achieving the set goals is possible through the development and implementation of social motivations (incentives and encouragement), actualization of the need for continuous improvement of professionalism, and creating conditions for preventing the outflow of specialists from the pedagogical field, along with the development of pedagogical technologies for teaching adults and increasing attention to the problems of personal development of teachers, taking into account the changes that occur in the process of professional activity, as well as creating conditions for optimization and harmonization of professional improvement trends [1, p. 39].

In the Ukrainian educational space, professional development of a teacher is defined as “the acquisition by a person of new and/or improvement of previously acquired competences within the limits of professional activity or field of knowledge” (Article 18 of the Law on Professional Development) [9], “bringing pedagogical



knowledge, skills and competences into compliance with the requirements of modernization of the education system” [9].

It should be noted that Ukrainian teachers are obliged to constantly improve their professional and general cultural level and pedagogical proficiency (Article 54 of the Law of Ukraine “On Education” section 2) [6]. At the same time, specialists are given the right to freely choose educational programs, forms of education, an educational establishment, institution or organization, other entities of educational activity that carry out professional development. It is important that “the forms and types of professional development chosen by a teacher really lead to the acquisition of new and/or improvement of existing competencies (knowledge, abilities, skills, etc.)” [9]. The following sequence of actions has been developed to prepare for professional development of specialists: to conduct a self-assessment of one’s own professional (specialist and general) competences and pedagogical skills, to realize the needs; to receive advice from colleagues based on the results of demonstration lessons / other forms of monitoring of pedagogical activity, to search for professional development entities that can meet these needs, to choose the form and type of professional development.

State documents also define the forms of professional development of Ukrainian specialists, which can be combined if necessary – institutional (full-time (day/evening), part-time, remote, online), dual or at the workplace. The types of professional development include training under the professional development program, participation in seminars, workshops, trainings, webinars, master classes, etc., as well as internships. The main type of professional development of teachers remains training under the professional development program [9].

In order to achieve the respective goals of improving the qualifications of teachers, there is a need to have a modern content of specialist training. Thus, the application of a multi-component model of improving the qualifications of teachers of natural and



mathematical subjects involves consideration of the issues of innovative and traditional technologies of teaching students and the use of digital technologies in the educational process, as well as conducting a practical session on solving problems in elementary mathematics, along with consideration of the scientific and theoretical foundations of the subjects and familiarization with the method of popularization of modern science and practical application of its findings [3]. Teacher training according to the general model of the cloud-oriented methodical system for improving the qualifications of teachers of natural and mathematical subjects contributes to the training of ICT competent professionals, highly qualified specialists for modern education. The model contains such components as a goal, a methodical system (basic, specialized and advanced methods), competence of open science, base and result [4, p. 3].

Of particular importance for the functioning of the system of improving the qualifications of Ukrainian teachers is the implementation of the competency model, which involves the development of a whole set of competencies (general, language-communicative, information-digital, psychological, emotional-ethical, pedagogical partnership, inclusive, health-preserving, projective, prognostic, organizational, evaluative and analytical, innovative, reflective, lifelong learning ability [5]). The improvement of the competences of specialists takes place both in the process of active activity on the basis of postgraduate pedagogical education institutions, and thanks to their participation in programs of professional development for any other forms and types of professional growth.

The study of the content of advanced training of teachers of natural and mathematical subjects in postgraduate pedagogical education of Ukraine shows that the content of the educational programs of advanced training of specialists is formed at the interdisciplinary level, namely: teaching methods of natural and mathematical subjects, pedagogy, psychology, information technologies, forms and methods of assimilation of information technologies in education. Analysis of the content modules



of the course curriculum confirms the provisions that in the content of advanced training, attention is paid equally to both general education and professional modules, as indicated by the distribution of hours by modules: general education is 50% (of which pedagogical practice equals 13% and modular control of general education module is 7%), professional equals 50% (of which pedagogical practice is 13% and modular control of the professional module is 7%).

For example, in the content of training for teachers who teach the subjects “Learning about nature”, “Environment”, “Natural sciences”, “Geography”, which is organized on the basis of the Institute of Postgraduate Pedagogical Education of the Chernivtsi region, relevant topics are included such as monitoring and overcoming educational losses, developing an educational program based on a model, approaches to the assessment of groups of general learning outcomes, filling in a journal and a certificate of student achievement, peculiarities of psychological and inclusive support of participants of the educational process, developing criteria for evaluating educational achievements of students in grades 5-6, etc. The educational and thematic plan covers five modules (30 hours / 1 ECTS credit) and is largely practice-oriented (training / practical classes - 28 hours) [8, p. 290].

The country’s choice of a European future encourages improvement of the content, forms and types of Ukrainian teachers’ professional development in accordance with the requirements of the European educational space, taking into account the national characteristics of Ukraine. It is valuable to study the changes taking place in the development of pedagogical education in the Republic of Poland, including in the system of professional improvement of teachers, in accordance with the requirements of the European educational space. At the organizational level, this means “modernization of the content and methodology of building educational programs based on the competence approach, improvement of the content of training, retraining and upgrading of the qualifications of pedagogical workers; diversification



of teaching languages in institutions of higher pedagogical education, creation of conditions for ensuring the quality of pedagogical education in accordance with the European standards and recommendations” [2, p. 4].

According to Polish scientists, an important characteristic of representatives of the teaching profession is the recognition of a teacher as “a person who continuously improves and develops, thus increasing his professional qualifications” [16, p. 97]. The principle of continuous education for adults, in turn, is established in the Law of the Republic of Poland “On Education” (2016) [15]. Also, in Poland there is a legal act that regulates the professional improvement of teachers – “Teacher’s Card” (1982; with subsequent changes) [10]. The document provides for continuous professional development of teachers and requires professionals to strive for full personal development (Article 6:3), to improve their general and professional knowledge, using the right of priority to participate in all forms of professional development at the highest level. According to Polish legislation, professional qualification improvement (“podnoszenie kwalifikacji (doksztolanie)”) means the acquisition or replenishment of knowledge and skills by an employee at the initiative of the employer or with his consent (§1 Art. 103¹) [11].

The main directions of the implementation of the national educational policy of the Republic of Poland on the issue of professional development are professional training based on close cooperation with employers, development of professional counseling, formation of digital competences of teachers, along with safe and responsible use of resources available on the network [17].

Forms of professional development of Polish teachers are divided into institutional, carried out in institutions outside the teachers’ place of work (external institutes), and forms of intra-school improvement. The institutional forms of professional development of teachers are studying under a postgraduate education program, upon obtaining a qualification in the postgraduate education system; professional development courses,



ПЕДАГОГІЧНА АКАДЕМІЯ: НАУКОВІ ЗАПИСКИ

qualification courses, seminars, trainings, conferences, and methodical meetings. The forms of intra-school professional development include a conference (pedagogical, educational, thematic), an education day, a seminar, systematic counseling, social observation, a study trip, a supervision group, a group support.

Polish teachers, taking individual participation in various external forms of professional development that have interested them, should ensure that the process of professional development does not interfere with the implementation of their professional activities. Thus, teacher training is planned in larger numbers on weekends or vacation time. If necessary, the director of the institution must agree to professional improvement and may even reimburse part of the expenses for the training of a specialist from the fund formed by the local government bodies for these purposes in the amount of 1% from the planned annual appropriations for teacher salaries. Such forms include advanced training under a postgraduate education program, obtaining qualifications in postgraduate education, as well as advanced training courses, qualification courses, seminars, conferences, methodical meetings and other short-term forms [14].

The professional development of teachers, which is organized within the secondary education institution directly at the teacher's workplace (in-school professional development), is carried out according to thematic areas – the content and methods of teaching subjects, innovative methods and forms of education, the development of educational programs; the introduction of multimedia into the educational process, organization of competitions, and effective teaching strategies; support for teacher's professional development, documentation management, and use of a foreign language in the field; improvement of computer skills, teacher's professional problems, and implementation of a new basic program. The types of intra-school professional development are conferences (pedagogical, educational, thematic), study days, seminars, system consulting, social observation, study trips, and complex



support [17].

Consulting technologies and consulting practice in the field of school education have also become widespread in the Republic of Poland. The use of consultations is an important element of the system of professional improvement of Polish teachers. Methodical advisers work at the level of voivodships, municipal level or in the institutions of communes. Consulting, as a process of providing qualified assistance in a problematic situation, associated with the use of flexible technologies, requires the involvement of versatile and objective information. The process of counseling participants in educational relations, aimed at improving the quality of education and training, is effective if the results of objective measurements of students' educational achievements are used. Based on the results of the evaluation, the consultant provides recommendations to the manager, the teacher, and parents on solving difficulties, determining the most effective line of behavior in a specific managerial or educational situation. The need for consulting services is determined by their quality level, which, in turn, depends on the ability of consultants to obtain analytical information (general and specific) about the educational achievements of students.

Today, electronic reference and educational portals, which contain for a wide range of specialists thorough information about various educational programs on the market of educational services provided by the institutions of professional improvement of teachers of the Republic of Poland, are considered promising for improving the qualifications of teachers. Among the popular open English-language educational platforms in professional education are Coursera, edX, Udacity, Udemy, Futurelearn. In Poland, a well-known educational platform for open courses is Navoica, which was created as part of a non-commercial project called “Polish MOOC” (Massive Open Online Courses), commissioned by the Ministry of Science and Higher Education (Ministerstwa Nauki i Szkolnictwa Wyższego). A significant number of English-language resources are offered for use, in particular for teachers of the natural



sciences – Physics Simulations, Lab, Physical Sciences, etc.

Перспективними на сьогодні для підвищення кваліфікацій вчителів вважаються електронні довідкові й освітні портали, що містять для широкого кола фахівців ґрунтовну інформацію про різноманітні освітні програми на ринку освітніх послуг, які надаються закладами професійного вдосконалення вчителів Республіки Польща. Серед популярних відкритих англomовних освітніх платформ в професійній освіті – Coursera, edX, Udacity, Udemy, Futurelearn. У Польщі відомою освітньою платформою відкритих курсів є Navoica, яка створена в рамках некомерційного проєкту під назвою “Polish MOOC” (ang. MOOC, Massive Open Online Courses), на замовлення Міністерства науки і вищої освіти (Ministerstwa Nauki i Szkolnictwa Wyższego) [13]. Пропонується до використання значну кількість англomовних ресурсів, зокрема, для вчителів природничої галузі Physics Simulations, Lab, Physical Sciences тощо.

In our opinion, the recommendations developed by Polish colleagues on the organization of professional development of teachers are valuable for the organization of professional development of Ukrainian specialists [12]:

- Advanced training should be carried out outside of school classes within a specially provided time, namely, three times a year (before the beginning of the academic year, during the winter break and after the end of the academic year). The training proposal must be based on high standards in the training content.

- Teacher training at the central level should be coordinated by a single institution appointed and controlled by the ministry responsible for education and training. Such an institution should prepare a training offer in accordance with the instructions of the Ministry of Education, develop a program and terms of training, and train employees who will then prepare trainers in cascade at the regional and local levels.

- To conduct training on the basis that will guarantee familiarization of



specialists with the latest technologies and methods operating in the industry at the domestic and European level. Carrying out study visits to foreign educational institutions for the purpose of comparing teaching technologies, improving teachers' professional foreign language, teachers' acquisition of knowledge and skills necessary for preparing students for employment on the national and European market.

– The proposed topics of training are the issues of providing pre-medical care, improving subject knowledge and updating of content knowledge of the subject being taught, as well as communication techniques, resolution of interpersonal conflicts, and work with students who have special educational needs, along with individualization of work with students, activation of working methods in lessons, and sharing experience with teachers from other schools.

Over and above that, in our opinion, an urgent task is to increase the “sensitivity” of the teacher training system to the results of evaluating the educational achievements of schoolchildren obtained in the process of independent measurements of TIMSS (Trends in International Mathematics and Science Study) and PISA (Program for International Student Assessment). Methodical support of the teacher's activity is the formation of study groups that unite specialists who have similar results of evaluating the educational achievements of students and providing them with consulting services.

The practical significance of the results of our research can be seen in the development and implementation of educational and methodological support for teachers and students of the teacher training system, which includes the educational and methodological manual “Professional development and advanced training of teachers in post-graduate education of Ukraine and the Republic of Poland”, methodological recommendations “Modernization of content, forms and methods of improving the qualifications of teachers of science and mathematics subjects in postgraduate education of Ukraine, taking into account the experience of the Republic of Poland”. It was developed the curricula and educational programs for improving the qualifications of



teachers. It was enriched the content of the educational modules “Current state of the development of science and mathematics education”, “Trends in the development of education of the 21st century”, and educational modules, namely the topics: “New Ukrainian School: implementation of the competence approach in teaching science subjects”, “Professional improvement of teachers of the Republic of Poland”, “Organization of the international project “In search of Einstein – Academy of Minds”, “Content, forms and methods of improving the qualifications of teachers of natural and mathematical subjects in post-graduate education of Ukraine and Poland”, “Prospective directions of the implementation of Polish experience in the improvement of the qualifications of Ukrainian specialists”. It was implemented the educational module “Quality of higher education and expert support for its provision: movement of Ukraine towards the European Union” (3587094-EPP-1-2017-1-UA-EPPJMO-MODULE) as part of the “Erasmus+: Jean Monet” Project.

Conclusions. Thus, the organization of teacher training in postgraduate pedagogical education in Ukraine and Poland has many similarities and is characterized by a variety of content, forms and types, as well as specific features, which is explained by the peculiarities of historical development, national traditions and priorities of the educational needs of teachers in these countries.

Among the areas of modernization of the content and forms of organization of Ukrainian teachers’ professional development in postgraduate education, it is necessary to highlight changes at the national level – legislative and organizational changes in the development of postgraduate pedagogical education in the country in accordance with the requirements of the European educational space, at the regional level – renewal of the general cultural component of specialist professional development thanks to the inclusion to it training in professional foreign languages, and at the level of institutions of general secondary education – the development of intra-school professional improvement of teachers.



We see the prospects for further research in the expansion of the range of countries under study in order to investigate the progressive experience in matters of choosing the content, forms and types of professional development of teachers in postgraduate pedagogical education.

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