Research Article



Received: 22 November 2025 / Accepted: 05 April 2026 / Published: May 2026

# Stages of Development of Postgraduate Teacher Training in Ukraine Compared to the European Model

**Liudmyla Melenets***

**Ninel Klymenko**

**Natalia Petroshchuk**

**Svitlana Savchenko**

**Yurii Cherpak**

*Borys Grinchenko Kyiv Metropolitan University, Ukraine*
*Corresponding author**

***DOI: https://doi.org/10.36941/jesr-2026-0322***

## *Abstract*

*The article presents a comparative analysis of the stages of development of postgraduate teacher training (PTT) in Ukraine and four countries of the European Union (EU) (Poland, Finland, Germany, and France) for 1991–2024. The relevance of the study is determined by the need to modernize the national system of advanced training in the context of European integration, digitalization and reform of general secondary education. The research employed the following methods: content analysis of legislative acts, a chronological reconstruction of educational reforms, a comparison of postgraduate education models, a SWOT analysis of the Ukrainian system, as well as an analysis of financial costs (2020–2024). It is established that Ukraine implements a hybrid model with decentralization of financing and a 150-hour standard, while other countries apply decentralized (Poland, Germany) or centralized (France, partly Finland) approaches with an orientation towards digitalization, inclusiveness, and research methods. In 2024, the highest amount of spending on teachers' professional development (advanced training) was found in Germany (€3,830 million), the lowest in Ukraine (€92.5 million). The scientific novelty of the study lies in the integrated comparison of financial, regulatory, and institutional aspects of postgraduate teacher training across Ukraine and four EU countries. The results can be used to form an adaptive model of teachers' professional development in Ukraine.*

***Keywords:*** *Postgraduate education; teachers' professional development; financing of education; digital competencies; European educational models; comparative analysis; SWOT analysis; institutional policy; educational reform; advanced training.*

## 1. Introduction

In the modern world, continuous professional education, in particular the advanced training (AT) of teaching staff, plays a key role in ensuring the quality of school education, adapting to innovations and forming competitive human capital (Aktan, 2020). This issue is particularly relevant in the context of rapid digitalization, growing public expectations for the teachers' professional skills and in the context of the integration of national education systems into the European space (Hunt et al., 2021).

Postgraduate teacher training (PTT) is not only a tool for supporting teacher qualifications, but also a lever for implementing educational reforms, in particular the competency-based approach, inclusiveness and digital transformations (Hertz et al., 2022). At the same time, in many countries, in particular post-socialist ones, postgraduate education has long remained secondary to basic teacher training, and its institutional structure is fragmented.

Since 2016, Ukraine has made attempts to modernize this area through the concept of the New Ukrainian School (NUS), the adoption of a standard for advanced training (150 hours over 5 years), the introduction of the "money follows the teacher" principle, and the creation of the EdWay digital platform. At the same time, it is not entirely clear to what extent these reforms are consistent with European trends, in particular with models of postgraduate education in EU member states.

The analysis of the evolution of postgraduate education from 1991 to 2024 in comparison with Ukraine identified structural similarities and differences, assessing the level of financial support for this area, and giving grounds to propose adaptive development vectors for the Ukrainian system. The comparison of not only the regulatory framework, but also empirical indicators is of particular value. In particular, we analyse spending on teachers' professional development (PD, advanced training) in millions of euros, its share in the total education budget, as well as the type of model (centralized, decentralized, hybrid, etc.).

The study is based on a combination of quantitative and qualitative analysis. On the one hand, we conduct a statistical assessment of postgraduate education financing. On the other hand, we analyse key documents, legislation, concepts, and practices that underlie national educational policies.

The aim of the study is to conduct a comparative analysis of the stages of development of postgraduate pedagogical education in Ukraine and European countries (Poland, Finland, Germany, and France) in 1991–2024 in order to identify structural features, financial models, and strategic vectors of development.

Empirical objectives:

1. Conduct a chronological analysis of regulatory and legal reforms in the field of PTT in Ukraine and four EU countries in 1991–2024.

2. Identify the types of PTT models and correlate them with the amount of funding.

3. Conduct a comparative analysis of budget expenditures for advanced teacher training in five countries for 2020–2024 in millions of euros and as a % of the education budget.

4. Conduct a SWOT analysis of the model of PTT in Ukraine based on a comparison with European practices and identification of potential opportunities and threats in the context of adaptation to the standards of the European Education Area (EEA).

## 2. Literature review

Amemasor et al. (2025) reviewed 115 studies of online and blended PTT programmes, finding positive effects of digital training on teacher competence, motivation, and self-esteem, and sometimes on student performance. According to Nordgren et al. (2021), effectiveness depends on synchronous sessions, cooperative tasks, instructor support, and a feedback platform.

A shortcoming of most studies is the lack of analysis of funding, regulatory requirements, and institutional support. Rubach & Lazarides (2025) note that governments in Europe are investing in digital competence development and integrating DigCompEdu into teacher training, but without detailing budgets and mandatory hours. Annemann et al. (2025) used ICILS 2018 data for five countries (Chile, Denmark, Germany, South Korea, and the United States). The study showed that participation in digitally oriented trainings correlates with positive attitudes towards ICT and more frequent use of technology in the classroom.

The authors note that education systems differ significantly in terms of financial support and policies; no country has a unified regulatory framework for the number of hours of professional development (PD), which brings them closer to the hybrid model of Ukraine. Merino et al. (2025) summarized the elements of successful PTT programmes: teacher-as-learner orientation, contextualized programmes, collaboration, long-term engagement, reflexivity, and updating of content. Barriers include lack of time, limited resources, insufficient institutional support, workload and lack of financial incentives; researchers recommend subsidizing teacher replacement and compensating for costs. So, issues of financing and time management are critical for the effectiveness of PTT, but the articles lack comparative figures.

A paper on PD (Su & Wang, 2022) emphasizes that countries spend billions of dollars on teacher training, but teachers themselves rarely undergo targeted training programmes. The authors argue that teacher quality directly affects student performance. The paper does not provide information on hourly rates or budgets, but criticizes the fragmentation of policies.

A study of a regional initiative in the United States (Kinser-Traut & Marx, 2022) found that teachers want interactive and collaborative PTT programmes. However, 27% of surveyed teachers cannot find the courses they need, and school principals cite a lack of funding and time as the main challenges. The authors emphasize the importance of collaborative programme design and assessing the teachers' real needs. Unlike our study, the paper does not analyse regulatory requirements and budgets, but emphasizes the role of decentralized initiatives.

A pilot study in educational neuroscience (Hachem et al., 2022) designed a series of training sessions that applied the principles of effective PTT: practical orientation, collective interaction, and ongoing support. The pandemic forced classes to be conducted online, which reduced opportunities for collaboration; teachers refused additional support because of extreme workload. This demonstrates the dependence of the quality of PTT on institutional conditions and time, but the article does not provide information on funding.

A Polish-American study on the use of the Classroom Strategies Assessment System (CSAS) showed that 31 teachers received individual feedback after observations; teachers highly rated the need for PTT in classroom management and found personalized feedback useful (Poulou et al., 2023). The authors emphasize that effective PTT should be embedded in the work process (instructional coaching) and include informal assessment. Financial aspects are not disclosed, but the study shows that programme implementation is limited without administrative support and time.

Siddiqui & Kazmi (2023) review in-service PTT courses in Pakistan aimed at controlling antisocial behaviour. The authors note that the main barriers to participation include school management resistance, teacher reluctance, as well as lack of resources and funding. A three-year randomized programme in the United States, as Tazaz & Schoen (2023) noted, involved 48 hours of contact teaching per year. The authors indicate high teacher participation (approximately 75%) and completion of 82–87% of planned activities, but emphasize the need for flexibility and data collection on participant engagement. Disadvantages include the lack of cost data and reliance on volunteerism. Compared to the Ukrainian standard (150 hours/5 years), the programme appears intensive but has a narrow focus.

Dahl & Sturges (2023) describe the Project ECHO model, which combines distance learning, mentoring, and communities of practice to provide active contextualized learning and coaching,

particularly useful for rural educators. The advantage is lower cost, the disadvantage is the need for stable internet and trained facilitators. Romanenko (2018) emphasizes the transition of PTT from a formal to an innovative contextual model, which requires deep transformation, but almost does not consider funding and institutional responsibility, which reduces practical value. Petrenko (2020) develops this idea, but emphasizes not only a paradigm shift, but also strategic directions for the development of CPD in an open educational environment. Her study is distinguished by a broader vision of digitalization, networked learning, and institutional openness. Unlike Romanenko, Petrenko emphasizes the need for the autonomy of PTT subjects, but remains within the scope of theoretical and analytical discourse without a deep analysis of the regulatory and legal or financial framework.

At the same time, both authors agree on the crisis of classical forms of advanced training. Orlova & Kolesnikova (2023) offer a more structured and systemic approach, treating PTT as part of continuous professional education. The focus is on regulatory support and the logical inclusion of PTT in the European context of lifelong learning. The authors raise issues of state regulation, the employers' role, and consistency between levels of training. Unlike previous researchers, they touch on issues of financing as a state obligation, but do not detail its mechanisms.

Oleshko (2021) focuses on the regional dimension of PTT, particularly in the context of the implementation of the NUS reform in the regions. Unlike previous studies, he provides empirical observations, describing specific challenges, including financial insufficiency, administrative barriers, and lack of teachers' motivation. Oleshko justifies the appropriateness of a hybrid model that combines elements of centralization (state order) and autonomy (the teacher's right to choose the programme).

## 3. Methods and Materials

### *3.1 Research design*

The research was carried out in four interconnected stages.

At the first stage (January–March 2025), a preliminary selection of countries for comparative analysis was carried out based on the following criteria: EU membership, digital reforms in the field of PTT, and the availability of financial, statistical, and regulatory sources. The second stage (March–May 2025) was an in-depth content analysis of legislation and strategies for improving the teachers' qualifications in the selected countries.

At the third stage (May–July 2025), the share of the education budget allocated to PD was calculated, converted into euros, and visualizations were created. The fourth stage (July 2025) provided for a SWOT analysis of the Ukrainian model of postgraduate education based on the collected empirical data, as well as drawing general conclusions.

### *3.2 Research methods*

- Content analysis was used to study regulatory legal acts, strategic documents, concepts, and programmes of PTT. The analysis covered more than 20 documents, including: NUS (2025), DigitalPakt Schule (Germany), MEEF programmes (France), and the basic national curriculum (Finland). Coding was carried out manually by categories: scope of PD, type of model, funding mechanisms, digital components.

- Comparative analysis was conducted for systemic comparison of approaches to postgraduate education in five countries according to a number of parameters: legal regulation, institutional structure, financial support, degree of digitalization, inclusiveness. The results are systematized in two tables (stages of development; types of PD models).

- SWOT analysis was used to identify strengths and weaknesses of the Ukrainian model, as

well as opportunities and threats in the context of European integration transformation. The SWOT matrix was formed based on a synthesis of the regulatory framework, empirical data, international reports, and analytics of specialized platforms (Eurydice, Cedefop).

- Statistical analysis was used to calculate the average annual expenditure on PD in 2020–2024 in millions of euros, as well as to calculate the share of PD in the total education budget. The indicators were normalized according to the European Central Bank (ECB) exchange rate and official statistics of national authorities (Destatis, Statistics Finland, MEN FR). Visualization was carried out manually in Microsoft Excel. In all calculations, PD expenditures were defined as funds earmarked for in-service teacher training and professional learning activities, excluding investments in computer hardware or general ICT infrastructure.

*3.3 Sample*

Five countries were selected for comparative analysis: Ukraine, Poland, Finland, Germany, and France. The choice is determined by geographical and political representativeness: countries of Eastern and Western Europe, different models of education management (centralized, decentralized, federated).

The focus on these countries covers a wide range of approaches to PTT. The number of objects is limited to five to ensure the depth of analysis and the possibility of detailed comparison by qualitative and quantitative parameters.

*3.4 Instruments*

- Analytical matrix for comparing indicators of PD models (model type, regulatory burden, funding sources).
- Excel software for plotting graphs and calculating average values.
- Methodological framework of SWOT analysis adapted for the educational sphere (TOWS matrix).

## 4. Results

The study conducted a comparative analysis of the regulatory, conceptual, and institutional frameworks of PTT in Ukraine, Poland, Finland, Germany, and France for 1991-2024. Particular attention was paid to the chronology of key reforms, legislative initiatives, as well as the types of professional development models used in each country. Table 1 presents the obtained results to identify common trends and differences in approaches to the teachers' continuous PD.

**Table 1:** Stages of development of PTT in Ukraine and European countries (1991–2024).

| Reform timeline (1991–2024) | Key legislative acts/programmes |
|---|---|
| **Ukraine** | |
| **1991:** creation of a network of institutes of PTT providing advanced training for teachers.<br>**2016–2017:** a competency-based approach focused on the teachers' autonomy and practical skills. | Resolution of the Cabinet of Ministers of Ukraine No. 800 dated 21.08.2019 "Some Issues of Improving the Qualifications of Teaching and Academic Staff" – provides for 150 hours of PD in five years. |

| | |
|---|---|
| **2019:** the Ministry of Education and Science introduced a rule: teachers must undergo at least 150 hours of PD within 5 years; funding is based on the "money follows the teacher" principle.<br>**2020–2024:** the EdWay platform for choosing PD programmes was created; professional standards and updated NUS programmes were adopted | The NUS concept (2016) – modernization of the content of education and teacher training. |
| **Poland** | |
| **1990's:** transition to decentralized education; PD is regulated by the Kartą nauczyciela.<br>**2019:** the Resolution of 25 July 2019 defined new standards for teacher training in master's programmes aimed at harmonizing qualification requirements.<br>**2023:** amendment to the regulation on teacher training provides access to PD through various trajectories, including postgraduate programmes<br>**2023–2024:** the CyberLekcje 3.0 and Wirtualne Laboratoria Przyszłości projects provide teachers with digital materials and equipment to build digital competencies | Karta nauczyciela and related regulations — establish the obligation of local governments to finance PD (1% of the salary fund).<br><br>Resolution of the Ministry of Education and Science of 25.07.2019 and its amendment of 2023 — standards for teacher training and admission to the profession |
| **Finland** | |
| **1990's:** introduction of research-oriented master's training for teachers; emphasis on autonomy and reflective practice.<br>**2014:** new national core curriculum adopted; from 1 August 2016 it entered into force for grades 1-6, for grades 7-9 in 2017, 2018, and 2019. The curriculum focuses on transversal competencies, which required updating the PD.<br>**2017:** introduction of the Comenius Oath, a code of ethics for teachers, emphasizing long- | *National Core Curriculum for Basic Education* (2014) – defines new educational approaches and requirements for PD.<br><br>Code of Ethics and "Comenius Oath" (2017) – a commitment to support professional development and well-being |

| | |
|---|---|
| term moral responsibility.<br>**2020 2024:** increased focus on teacher well-being and the goal of the "purposeful teacher"; digital education and well-being programmes are being developed. | |
| **Germany** | |
| **1990's–2000's:** transition to two-level training (teacher training universities + reflection period).<br>**2016:** The *Bildung in der digitalen Welt and Berufsschule 4.0* strategies provide for the development of curricula, initial and continuing teacher education, digital infrastructure, and educational media.<br>**2019:** The federal *DigitalPakt Schule* programme (2019–2024) allocates 5.5 billion euros for digital infrastructure and improving teachers' digital competencies.<br>**2020–2022:** Additional funds for digital educational resources and equipment during the pandemic allocated; courses for distance learning developed | Strategies of the Standing Conference of Ministers of Education "Education in a Digital World" (2016) and "Vocational Schools 4.0".<br><br>Federal Programme *DigitalPakt Schule* (2019) – Investments in Digital Infrastructure and Teachers' PD |
| **France** | |
| **1991:** creation of university teacher training institutes (IUFM).<br>**2013:** The reform replaced IUFM with *Écoles supérieures du professorat et de l'éducation (ESPE)* with two-year master's programs MEEF (Métiers de l'Enseignement, de l'Éducation et de la Formation).<br>**2019:** The law "Pour une école de la confiance" (Law n°2019 791) emphasized that inclusive education should be integrated into initial teacher training; INSPE – new National Teacher Training Institutes.<br>**2020 2024:** MEEF programmes complemented with modules on | Law No. 2019 791 "For a School of Trust" – includes a mandatory module on inclusive education in INSPE.<br><br>MEEF programmes (Master MEEF) – a two-year professional master's degree in preparation for competitive exams; includes courses in digital technologies, innovative methods, international mobility |

| | |
|---|---|
| digital technologies, innovative methodologies, and scientific research | |

Source: created by the authors based on (Finnish National Agency for Education, 2014; Kuusisto & Tirri, 2021; Cedefop & ReferNet, 2025; European Agency for Special Needs and Inclusive Education, 2020; Eurydice, 2024).

The comparative analysis shows that the PTT systems of the studied countries have developed in different ways. Ukraine has decentralized financing according to the "money follows the teacher" principle and has set a standard of 150 hours for 5 years. Poland supports a decentralized model with municipal financing and digital initiatives.

Finland maintains research-oriented training, implements ethical codes and focuses on teacher well-being. Germany invests in digital infrastructure and competencies through federal programmes. France has centralized training in MEEF programmes with mandatory modules on inclusion and digitalization.

Despite the differences, all countries recognize the importance of continuous professional development and are focused on digitalization and inclusion. The approaches were arranged through a comparative analysis of PTT models summarized in Table 2, which shows institutional mechanisms, financing, regulatory burden and key content emphases, which vary significantly depending on national characteristics.

**Table 2:** Types of postgraduate education models in Ukraine and European countries (1991–2024).

| **Country** | **Type of postgraduate education model** |
|---|---|
| **Ukraine** | **Hybrid:** combination of state-run postgraduate institutions and free choice of courses (EdWay). Funding "money for the teacher"; standard – 150 hours over 5 years |
| **Poland** | **Decentralized with standard**: municipalities allocate 1% of salary fund for PD; teachers can take courses at universities, institutes or private providers. From 2023, emphasis on digital competencies |
| **Finland** | **Research-oriented, university-based**: teachers receive a master's degree; PD is supported by municipalities and provides three days of training each year. Emphasis on autonomy, ethics, and transversal skills |
| **Germany** | Federally decentralized: Länder are responsible for PD programmes; emphasis on digital competencies. Combination of mandatory courses (often 30 hours per year) and voluntary modules; active state support for digitalization |

| Country | Type of postgraduate education model |
|---|---|
| **France** | Centralized university model: teacher training takes place under MEEF master's programmes that combine theory, long-term practice, and research; PD is provided by INSPE with a focus on inclusive education, digital skills, and democratic values |

Source: created by the authors based on (Finnish National Agency for Education, 2014; Kuusisto & Tirri, 2021; Cedefop & ReferNet, 2025; European Agency for Special Needs and Inclusive Education, 2023; Eurydice, 2024).

The Law of Ukraine "On Education" provides for the allocation of at least 2% of the salary fund or subvention for advanced training. In Poland, the Teacher's Card establishes 1% of the salary fund. In Finland, collective agreements guarantee three days of training per year.

In Germany, the requirements vary by state (Hamburg and Bremen – 30 hours ≈ 2% of the time), in France – 18 hours per year, half of which is allocated to training. Average shares for 2020–2024: Ukraine – 2%, Poland – 1%, Finland – 1.6%, Germany – 2%, and France – 0.5%. These data are presented in Figure 1.

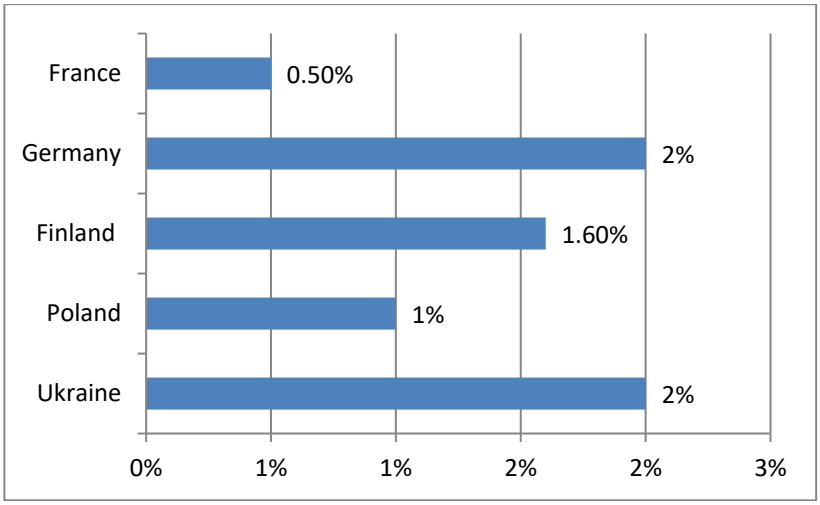


**Figure 1.** Expenditures on advanced training (as a % of the total education budget, average figures for 2020–2024).

Source: created by the authors based on official data from (Statistics Finland, (n.d.); Bagot et al., 2024; Destatis (2025); Verkhovna Rada of Ukraine, 2017; Eurydice, 2024).

The assessment of expenditure on postgraduate teacher education, converted into euros, shows a significant difference between the nominal budget volumes and the real share allocated to teacher training (Figure 2).

Analysis of the results in millions of euros avoids misinterpretations related to the scale of general educational funding and allows for an objective assessment of the relative priority of this

area in state educational policy. In this study, these amounts refer exclusively to expenditure on teachers' professional development and in-service training.

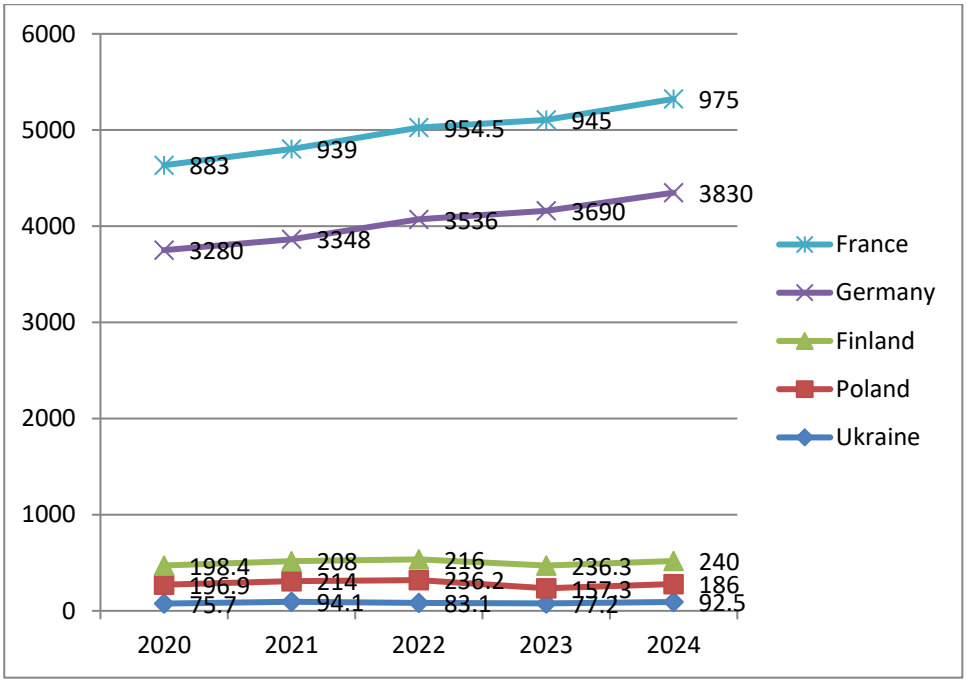


**Figure 2.** Estimated costs of advanced training (in million euros, 2020-2024).
Source: created by the authors based on official data from (Statistics Finland(n.d.); Bagot et al., 2024; Destatis (2025); Verkhovna Rada of Ukraine, 2017; Eurydice, 2024).
Note: Costs are converted into euros at the ECB exchange rate as of mid-2025.

Despite the fact that the total budgets for education in some countries (in particular in France and Germany) are measured in hundreds of billions of euros, real investments in teacher training remain within the hundreds of millions. In less economically powerful countries, such as Ukraine and Poland, these costs amount to only a few tens of millions of euros per year, even if the normatively established shares are observed. This imbalance emphasizes the relative marginalization of postgraduate education under national human capital development strategies.

The presented dynamics indicate that only a part of the European countries provide systematic institutional support for PTT, while in other countries (in particular post-socialist ones) funding remains vulnerable to economic fluctuations and political will. The gap between countries with high and low levels of investment in teacher PD is almost an order of magnitude, which should be taken into account when shaping a common educational policy.

Let us consider the key indicators of this system in Ukraine, Poland, Finland, Germany, and France for 2020–2024 (Table 3).

**Table 3:** PTT indicators in Ukraine and EU countries (2020–2024).

| Country | Number of programme participants (2020–2024) | Course duration | International internships (%) |
|---|---|---|---|
| Ukraine | ≈150 thousand teachers annually (about 750 thousand in 5 years) undergo advanced training. | 30 hours per year (minimum 150 hours in 5 years, according to the law). This is equivalent to approximately 1 week of full-time study each year. | < 1% (no official statistics; the share of teachers who undergo training abroad is negligible and is estimated at less than 1%) |
| Poland | Hundreds of thousands: for example, 580 thousand cases of advanced training were recorded in 2018–2021 (on average ~ ≈ 150–200 thousand teachers per year). In total, the figure is estimated at about 800 thousand participants for 2020–2024. | There is no fixed duration: programmes vary from short seminars (less than 8 hours for 21% of teachers) to long-term courses. The time of study is determined by the needs and the course programme (there are no official norms of hours). | ~1% or less. International mobility of Polish teachers is very low: according to EU education programmes, only about 0.5% of teachers participated in internships abroad. |
| Finland | Most teachers: ~80–85% of Finnish teachers participate in professional development programmes every year. (According to a 2018 survey, 84% of teachers improved their professional | 3 days per year (typical): officially, Finnish schools allocate several paid days (about 3) per year for teacher councils and training seminars. On average, a Finnish teacher spends ~3 days per year on advanced | A few percent. The share of Finnish teachers who undergo internships abroad is small (estimates range from 2–5%). This indicator is not officially published, but it is characteristically low for all the considered |

| | | | |
|---|---|---|---|
| | skills during the year). In numerical equivalent, this is tens of thousands of teachers annually (the country has ~60,000 teachers). | training. | countries. |
| Germany | About two-thirds of teachers. The level of participation of German teachers in professional development is lower than the European average: for example, only 57% of teachers attended in-person professional development seminars in 2018 (compared to ~76% on average worldwide). Including online courses and other forms, the total share could reach ~70–80%. In absolute figures, this amounts to hundreds of thousands of teachers (there are ~800,000 | ~3 days per year (depending on the state): Most federal states have a statutory benchmark of 2–3 days per year. For example, in Bavaria, the requirement is considered fulfilled with 12 days of course training over 4 years (≈3 days per year). | < 1%. Germany does not have nationwide data, but international teacher mobility is low. Only a few percent (or less) of German teachers participate in internship programmes abroad (e.g. through Erasmus+). |

| | | | |
|---|---|---|---|
| | teachers in the country). | | |
| France | About 75% of teachers annually. Before the pandemic, this figure was increasing: in the 2018/2019 academic year, ~81.6% of primary school teachers and 72.4% of secondary school teachers participated in at least one form of advanced training. On average, ~¾ of the total number of ~850 thousand French teachers – that is, approximately 600–650 thousand people per year – underwent training. The pandemic has slightly reduced these figures. | ~3 days per year. France officially requires a minimum of 3 days of in-service training per year for primary school teachers. By 2019, the average actual training duration had increased to almost 3 days per teacher per year. (This is still below the target of ~8 days per year). | ~1% or less. Participation of French teachers in international internships is minimal. Because of certain limitations (e.g., the difficulty of replacing during business trips), the proportion of those who do internships outside the country is very low (of the order of a few percent). Official data do not record this indicator separately. |

Source: created by the authors based on official data from (NUS, 2025; Osvita.ua, 2024; Najwyższa Izba Kontroli – NIK, 2022; Fundacja Rozwoju Systemu Edukacji, 2020; Opetushallitus, 2020; Cour des comptes, 2022; Anders & Kuhn, 2025).

In order to critically assess the current PTT model in Ukraine and identify vectors for its development in accordance with European practices, a comparative SWOT analysis was carried out. Table 4 summarizes the strengths and weaknesses of the Ukrainian system, as well as the opportunities and potential threats that arise in the process of adaptation to the standards of the European Educational Space. The analysis was based on the results of empirical research, analysis of regulatory documents, financing dynamics, types of educational models, and the experience

of EU countries.

**Table 4:** Comparative SWOT analysis of the Ukrainian PTT model.

| Strengths | Weaknesses | Opportunities | Threats |
|---|---|---|---|
| State regulation and legislatively defined norms (150 hours in 5 years) | Excessive bureaucratization of advanced training procedures | European integration and harmonization with European standards (e.g. Erasmus+, digital frameworks) | Underfunding of the sector, reduction of priority during the war |
| Availability of institutes of PTT (IPPE) in each region | Lack of a single digital platform with high-quality, verified courses | Development of online education and EdTech platforms (EdWay, MOOC) | High staff turnover and outflow of qualified teachers abroad |
| Implementation of a hybrid model of "money follows the teacher", stimulating competition among providers | Insufficient quality control of PD courses; fragmented recognition of results | Decentralization of educational policy as a way to adapt regional practices | Loss of human resource potential because of instability of education policy |
| Establishment of professional standards and updating the content of professional development programmes in accordance with the NUS | Lack of an established mechanism for external monitoring of PD results | Possibility of participation in international professional development projects (e.g. eTwinning, Erasmus Teacher Academies) | External challenges: war, economic instability, migration of teachers |

Source: developed by the authors.

SWOT analysis shows that the Ukrainian model of PTT has significant potential for modernisation. This potential can be realised if the system receives targeted state support, undergoes digital transformation, and is integrated into European human resource development mechanisms.

Despite the existence of a stable regulatory framework and infrastructure (IPPO, EdWay), the system suffers from fragmentation, a lack of digital solutions, and insufficient funding. Participation in international educational initiatives, the implementation of external quality monitoring systems, and the development of flexible digital courses can significantly increase the

effectiveness of advanced teacher training. However, for the sustainable improvement of the model, threats associated with staff losses, the lack of systemic state support, and political risks should be minimized.

## 5. Discussion

Compared to the review by Amemasor et al. (2025), our study provides specific financial indicators that most international reviews lack. The systemic review provides a description of effective programmes only, but no information on budget share or target hours, making it impossible to compare investments across countries.

Our analysis fills this gap, showing that even a small budget share (0.5–2%) results in costs of hundreds of millions of euros. These amounts illustrate that professional development remains a marginal yet financially substantial component of national education budgets.

The American CGI programme (48 hours per year) proposed by Tazaz & Schoen (2023) and the Project ECHO model proposed by Dahl et al. (2023) emphasize intensive short-term training with high participation, but do not consider systemic financial support and long-term targets. Our study shows that long cycles (150 hours over 5 years) can be combined with flexible course selection and stable funding, which may be more adaptable to large-scale reforms.

In Siddiqui & Kazmi (2023), administrative resistance and lack of resources are the main obstacles to ESL. Similar barriers are described in the Impact! study (Chile): lack of time, weak IT infrastructure, lack of motivation Didier et al. (2025). Our analysis confirms these challenges: in Ukraine there is a risk of underfunding and bureaucratization, especially under martial law. However, a hybrid model with the "money follows the teacher" principle and the EdWay digital platform can mitigate the impact of bureaucracy.

Research on CSAS PD and regional enterprise confirms that teachers prefer contextualized, coaching models and need interactive feedback (Poulou et al., 2023). Our results also point to the need for external monitoring of quality and development of communities of practice. Unlike most reviews, we calculated the dynamics of spending for the first time and showed that Ukraine gradually increased investment in PTT in 2020–2024 (by 22%), despite the crisis.

Annemann et al. found that teacher participation in digitally oriented in-service training programmes in Chile, Denmark, Germany, Korea, and the USA is associated with positive attitudes towards ICT and more frequent use of digital tools in the classroom. However, the authors emphasize the lack of representative data on the normatively defined volumes of PTT and their financing. Our study, in contrast, combines normative requirements (150 hours over 5 years in Ukraine, 30 hours annually in Hamburg and Bremen, 18 hours in France, etc.) with an analysis of budget allocations, showing that the share of spending on PTT in the participating countries is 0.5–2% of the total education budget (Figure 1). It was found that in 2024, Germany allocated €3,830 million for PTT, France – €975 million, Finland – €240 million, €Poland – 186 million, and €Ukraine – 92.5 million. These figures demonstrate the difference between countries that is overlooked in most studies on teacher digital competence.

Our findings on decentralized and hybrid PTT models are consistent with French and German studies that confirm the benefits of decentralized funding and university-based master's programmes (Tondeur et al., 2023). The literature lacks comparisons of centralized and decentralized models in terms of funding; our analysis fills this gap by showing that even with the same standards, costs can vary by dozens of times. Inamorato dos Santos et al.'s (2023) study suggests that high self-reported digital competence does not guarantee sustainable professional development without systemic changes in PTT, clear standards, and budgetary support.

Most peer-reviewed papers point to the need for long-term and context-specific professional development programmes. A systemic review by Amemasor et al. (2025) found that effective integration of digital learning requires long-term (more than a year) training,

mentoring, and communities of practice; only one-third of teachers regularly use digital tools, and over 40% feel underprepared. Similarly, Liu et al. (2024) note that professional communities significantly enhance the impact of digital training on technology integration in STEM education. Our data suggest that the Ukrainian hybrid model, combining state institutions and free course choice, potentially facilitates the formation of such communities, but their sustainable operation requires systematic support and monitoring of results.

In Lebanon, it was found in 2023 that pre-service teachers significantly outperformed students in teaching professions in digital skills. It was suggested to integrate digital tools into curricula, provide practical training, and promote peer collaboration (Momdjian et al., 2024). Our work agrees with these recommendations and adds that standardized norms (150 hours of professional development in Ukraine) should be combined with flexible learning trajectories and platforms such as EdWay for programme selection.

Earlier studies have mostly focused on teachers' self-assessments of competence and individual factors. Our article combines a chronological reconstruction of reforms, a comparison of PTT models, a financial analysis, and a SWOT analysis of the Ukrainian system. This approach identifies not only the level of digital training, but also structural and financial obstacles.

## 6. Conclusions

The study revealed significant variability in models of PTT in European countries, which is due to differences in management approaches, financing, regulatory requirements and the degree of integration of digital solutions. Ukraine, being in conditions of political and economic instability, demonstrates a gradual transformation of the PTT system towards hybridization, in particular by implementing the principle of "money follows the teacher", launching the EdWay digital platform and updating professional standards.

The SWOT analysis identified the strengths of the Ukrainian model (regulatory certainty, availability of infrastructure, hybrid financing model), as well as key challenges – lack of quality control, fragmentation of digital solutions, and risks of loss of human resources. This emphasizes the need for strengthening external monitoring, institutional support for online education, and strategic integration into European educational initiatives.

### *6.1. Scientific novelty of the study*

The scientific novelty of the study lies in providing a first comprehensive comparative assessment of PTT in Ukraine and selected EU countries based on the integration of regulatory, financial, institutional, and strategic analysis with an emphasis on digitalisation and inclusion. The proposed approach compares PTT models through the lens of financing, PD standards, and institutional design.

### *6.2. Practical value*

The results of the study can be used in the process of developing educational policy, updating professional standards, as well as in the activities of postgraduate education institutions and EdTech platforms. The identified guidelines for adapting the Ukrainian model to European requirements contribute to improving the quality of teacher training in the context of European integration.

### *6.3. Research limitations*

The study is reduced to the analysis of only five countries (Ukraine, Poland, Finland,

Germany, and France), which does not cover the full range of European models of PTT.

*6.4. Research limitations*

It is appropriate to expand the comparative analysis to other EU countries, in particular from Eastern and Southern Europe.

***References***

Aktan, O. (2020). Evaluation of postgraduate education in terms of career development of teachers. *Journal of Higher Education & Science/Yükseköğretim ve Bilim Dergisi*, *10*(3), 596-607. https://dergipark.org.tr/tr/download/article-file/1821874

Amemasor, S. K., Oppong, S. O., Ghansah, B., & Benuwa, B.-B., & Essel D. (2025). A systematic review on the impact of teacher professional development on digital instructional integration and teaching practices. *Frontiers in Education, 10*. https://doi.org/10.3389/feduc.2025.1541031

Annemann, C., Menge, C., & Gerick, J. (2025). Teachers' participation in digitalization-related professional development: An international comparison. *Education Sciences, 15*(4). https://doi.org/10.3390/educsci15040486

Cedefop, & ReferNet. (2025). Digital education and upskilling of VET teachers: Germany. In Cedefop, & ReferNet. (2025). *Timeline of VET policies in Europe* (2024 update) *[Online tool]*. CEDEFOP. https://www.cedefop.europa.eu/en/tools/timeline-vet-policies-europe/search/28145

Cour des comptes. (2022). *Continuing education for public education teachers: 2017–2021 financial years*. Cour des comptes. https://www.ccomptes.fr/sites/default/files/2023-10/20230907-S2023-0729-Formation-continue-enseignants.pdf

Dahl, E., & Sturges, H.A. (2023). The use of the ECHO model™ for education as an innovative approach to educator professional development. *Frontiers in Education*, *8*. https://doi.org/10.3389/feduc.2023.1151915

Statistisches Bundesamt (Destatis). (2025, December 11). *Expenditure (basic funds) of public budgets on education*. Federal Statistical Office of Germany. https://www.destatis.de/EN/Themes/Society-Environment/Education-Research-Culture/Educational-Finance-Promotion-Education-Training/Tables/expenditure-public-budgets-education.html

Anders, F., & Kuhn, A. (2025, February 4). *Was macht gute Lehrerfortbildung aus?* Deutsches Schulportal. https://deutsches-schulportal.de/bildungswesen/was-macht-gute-lehrerfortbildung-aus/

Didier, L. S., Schildkamp, K., Visscher, A. J., & Bosker, R. J. (2025). Factors influencing the implementation of a teacher professional development program to improve teaching quality. *Frontiers in Education, 10*. https://doi.org/10.3389/feduc.2025.1546448

European Agency for Special Needs and Inclusive Education. (2020). *Country information for France – Teacher education for inclusive education*. European Agency for Special Needs and Inclusive Education. https://www.european-agency.org/country-information/france/teacher-education-for-inclusive-education

Eurydice. (2024). *Initial education for teachers working in early childhood and school education – France*. European Education and Culture Executive Agency. https://eurydice.eacea.ec.europa.eu/eurypedia/france/initial-education-teachers-working-early-childhood-and-school-education

Finnish National Agency for Education. (2014). *National core curriculum for basic education 2014 [implemented 2016–2019]*. Finnish National Agency for Education. https://www.oph.fi/en/education-and-qualifications/national-core-curriculum-primary-and-lower-secondary-basic-education

Fundacja Rozwoju Systemu Edukacji. (2020). *Mobile teachers transform their schools: A country report on the impact of Erasmus+ mobility projects on school education staff*. FRSE. https://www.frse.org.pl/brepo/panel_repo_files/2021/02/18/ta5eig/raport-nauczyciele-final.pdf

Hachem, M., Daignault, K., & Wilcox, G. (2022). Impact of educational neuroscience teacher professional development: Perceptions of school personnel. *Frontiers in Education, 7*. https://doi.org/10.3389/feduc.2022.912827

Hertz, B., Grainger Clemson, H., Tasic Hansen, D., Laurillard, D., Murray, M., Fernandes, L., Gilleran, A., Rojas Ruiz, D., & Rutkauskiene, D. (2022). A pedagogical model for effective online teacher professional

development – findings from the Teacher Academy initiative of the European Commission. *European Journal of Education*, 57, 142–159. https://doi.org/10.1111/ejed.12486

Hunt, P., Leijen, Ä., & van der Schaaf, M. (2021). Automated feedback is nice and human presence makes it better: Teachers' perceptions of feedback by means of an e-portfolio enhanced with learning analytics. *Education Sciences, 11*(6). https://doi.org/10.3390/educsci11060278

Inamorato dos Santos, A., Chinkes, E., Carvalho, M. A. G., Solórzano, C. M. V., & Marroni, L. S. (2023). The digital competence of academics in higher education: Is the glass half empty or half full? *International Journal of Educational Technology in Higher Education, 20*(1). https://doi.org/10.1186/s41239-022-00376-0

Kinser-Traut, J. Y., & Marx, R. W. (2022). Designing a regional teacher professional development enterprise. *Frontiers in Education, 7*. https://doi.org/10.3389/feduc.2022.862373

Kuusisto, E., & Tirri, K. (2021). The challenge of educating purposeful teachers in Finland. *Education Sciences, 11*(1). https://doi.org/10.3390/educsci11010029

Liu, J., Aziku, M., Qiang, F., & Zhang, B. (2024). Leveraging professional learning communities in linking digital professional development and instructional integration: Evidence from 16,072 STEM teachers. *International Journal of STEM Education, 11*. https://doi.org/10.1186/s40594-024-00513-3

Merino, C., Pacheco, G., Arenas-Martija, A., Becerra, R., & Solís-Pinilla, J. (2025). Continuing professional development in teachers: Insights for designing a formative trajectory in scientific education. *Frontiers in Education, 10*. https://doi.org/10.3389/feduc.2025.1537502

Bagot, L., Dutey, C., Fornel, C., Liogier, V., & Rousseau, S. (2024). En 2023, 189,9 milliards d'euros consacrés à l'éducation, soit 6,7 % du PIB. *Note d'Information*, 24-45.https://doi.org/10.48464/ni-24-45

Momdjian, L., Manegre, M., & Gutiérrez-Colón, M. (2024). Assessing and bridging the digital competence gap: A comparative study of Lebanese student teachers and in-service teachers using the DigCompEdu framework. *Discover Education, 3*. https://doi.org/10.1007/s44217-024-00308-2

Najwyższa Izba Kontroli – NIK (2022). *Digital competences in schools – Supreme Audit Office report*. Najwyższa Izba Kontroli. https://www.nik.gov.pl/aktualnosci/edukacja-i-nauka/kompetencje-cyfrowe.html

Nordgren, K., Kristiansson, M., Liljekvist, Y., & Bergh, D. (2021). Collegial collaboration when planning and preparing lessons: A largescale study exploring the conditions and infrastructure for teachers' professional development. *Teaching and Teacher Education, 108*. https://doi.org/10.1016/j.tate.2021.103513

NUS. (2025). *The subsidy for advanced training of teachers was used by 52.7%. New Ukrainian School*. New Ukrainian School. https://nus.org.ua/2025/02/07/subventsiya-na-pidvyshhennya-kvalifikatsiyi-pedagogiv-vykorystana-na-52-7/

Oleshko, P. S. (2021). Postgraduate pedagogical education of the region in the conditions of the "New Ukrainian School". *Pedagogical Search,* 3(95). https://op.ua/images/common/6/6/1/1/60e3097158699.pdf

Opetushallitus. (2020). *Teachers and principals in Finland 2019: Teacher participation in continuing and in-service training, expert exchanges and working life periods*. Opetushallitus. https://www.oph.fi/sites/default/files/documents/opettajat_ja_rehtorit_suomessa_2019_opettajien_osallistuminen_jatko_ja_taydennyskoulutukseen_asiantuntijavaihtoon_seka_tyoelamajaksoille.pdf

Orlova, O. A., & Kolesnikova, I. V. (2023). Postgraduate education as a component of continuous professional education of teachers. *General pedagogy and history of pedagogy. Theory and methodology of professional education, 6*5(2), 87-90. https://doi.org/10.32782/2663-6085/2023/65.2.18

Osvita.ua. (2024). *Is 30 hours of professional development per year enough for a teacher?* Osvita.ua. https://osvita.ua/news/polls/91543/

Petrenko, L. M. (2020). Strategic guidelines for the professional development of scientific and pedagogical workers in open education. *Bulletin of Postgraduate Education, 13*(42), 170-184. https://doi.org/10.32405/2218-7650-2020-13(42)-170-184

Poulou, M. S., Reddy, L. A., & Dudek, C. M. (2023). Teachers and school administrators' experiences with professional development feedback: The classroom strategies assessment system implementation. *Frontiers in Psychology, 14*. https://doi.org/10.3389/fpsyg.2023.1074278

Romanenko, M. (2018). Postgraduate pedagogical education in the realities of the "New Ukrainian School": Methodological dimension of innovative changes. *Postgraduate education in Ukraine, 1*, 12-15. http://umo.edu.ua/images/content/nashi_vydanya/pislya_dyplom_osvina/1_2018/%D0%9F%D0%9E__1_2018_%D0%9C.%D0%A0%D0%BE%D0%BC%D0%B0%D0%BD%D0%B5%D0%BD%D0%BA%D0

%BE.pdf

Rubach, C., & Lazarides, R. (2025). Editorial: Empowering teacher professionalization with digital competencies. *Education Sciences, 15*(7). https://doi.org/10.3390/educsci15070867

Siddiqui, S., & Kazmi, A. B. (2023). Teacher professional development for managing antisocial behaviors: A qualitative study to highlight status, limitations and challenges in educational institutions in the metropolis city of Pakistan. *Frontiers in Education*, 8. https://doi.org/10.3389/feduc.2023.1177519

Statistics Finland. (n.d.). *Current expenditure on regular education system by type of expenditure, 2000–2023 (StatFin database table 12g6, Educational finances)*. Statistics Finland. https://pxdata.stat.fi/PxWeb/pxweb/en/StatFin/StatFin__kotal/statfin_kotal_pxt_12g6.px/

Su, H., & Wang, J. (2022). Professional development of teacher trainers: The role of teaching skills and knowledge. *Frontiers in Psychology, 13*. https://doi.org/10.3389/fpsyg.2022.943851

Tazaz, A. M., & Schoen, R. C. (2023). An implementation analysis of a Cognitively Guided Instruction (CGI) teacher professional development program. *Frontiers in Education, 8*. https://doi.org/10.3389/feduc.2023.1150229

Tondeur, J., Howard, S. K., van Zanten, M., Gorissen, P., van der Neut, I., Uerz, D., Kral, M., & Specht, M. (2023). The HeDiCom framework: Higher education teachers' digital competencies for the future. *Educational Technology Research and Development, 71,* 33–53. https://doi.org/10.1007/s11423-023-10193-5

Verkhovna Rada of Ukraine. (2017). *On education*. Kodeksy. https://kodeksy.com.ua/pro_osvitu/78.htm