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Professional Training of Preschool and Primary Education Teachers in the Context of Updated Standards

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Abstract

This study analyzes the features of professional training for future preschool and primary education teachers in the context of implementing updated higher education standards (May 2025). The article compared the professional training outcomes of higher education applicants who studied under the previous standards and the updated standards (2024-2025). The total sample was 289 people and included bachelor's and master's students in the specialties "Preschool Education" and "Primary Education", as well as teachers. The study used an independent-samples t-test, Pearson correlation analysis, hierarchical regression, mediation analysis with bootstrap estimation, and thematic qualitative analysis. The results indicated that students who studied according to the updated standards developed professional and general competencies to a significant degree. The authors found strong positive relationships between professional competencies, the ability to apply knowledge, and professional readiness for pedagogical activity. At the same time, the qualitative analysis revealed increased reflexivity and a more practical orientation in training. Therefore, the updated higher education standards have the potential to increase the level of general competencies of future teachers and structurally change the profile of their professional training into a reflexive-methodical and practically meaningful model.

Keywords: preschool and primary education, professional training of teachers, competence-based approach, professional readiness, standards

1. Introduction

1.1 Introducing the Problem

Current changes in the educational space, driven by active digitalization processes, increased mobility of specialists, and the adoption of competency-based learning models, have impacted the requirements for professional training of teachers. Accordingly, training specialists in preschool and primary education has become particularly important, as these levels form the basic cognitive, social, and emotional prerequisites for lifelong learning.

In most European countries, the process of professional training of teachers is based on the coordination of national educational standards with international qualification frameworks, which are focused on learning outcomes, the development of pedagogical autonomy, and readiness to work in a multicultural and inclusive environment (Zhyhora et al., 2024; Vujičić & Čamber Tambolaš, 2017; Wiegerová et al., 2024). At the same time, Ukraine, which is modernizing its education system and integrating into the European Higher Education Area, has updated standards for training pedagogical personnel, including in preschool and primary education. At the same time, the question of how effectively these standards are implemented at the level of specific educational programs and how they ensure the competitiveness of graduates in the international market of educational services remains insufficiently studied. Current scientific research has mainly been aimed at the theoretical understanding and analysis of the competency-based approach or the study of various individual aspects of professional training of teachers (Vdovenko et al., 2022; Zavirtrenko et al., 2019). However, direct empirical research analyzing the requirements of the updated standards and

comparing them with the outcomes of training preschool and primary education teachers remains limited (Behas et al., 2019). This creates an important scientific gap between declared regulatory guidelines and their actual implementation in higher education institutions (Kozak et al., 2025; Semigina, 2022). In addition, the relevance of this study lies in conducting an empirical analysis of the professional training of future teachers within the framework of the updated standards of higher education and considering international trends in the development of pedagogical education. It focuses on the development of key and professional competencies, professional skills, and graduates' ability to integrate effectively into the educational space.

Therefore, the results will serve as a basis for developing theoretical frameworks and can be used to improve educational programs within the current internationalization of pedagogical education.

1.2 Theoretical Framework

In current scientific discourse, modern pedagogy is described as a strategic resource for societal development, ensuring the formation of human capital and educational sustainability amid active transformations. In this sense, professional training for preschool and primary school teachers has gained special importance because these levels of education determine the basic trajectories of an individual's cognitive, social, and emotional development (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025a; 2025b).

The theoretical basis of this study is the competency paradigm of pedagogical education. According to this paradigm, the training of a future teacher is determined not by the amount of acquired knowledge, but by the ability to integrate knowledge, skills, values, and experience to solve professional tasks at different levels. Within this approach, the professional competence of a teacher is considered a dynamic system that is formed in the process of combining theoretical training and practical experience (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025a; 2025c).

At the same time, the updated standards of higher education in Ukraine, as well as the transformation of the classification of specialties in 2025 (transition from specialties 012 “Preschool Education” and 013 “Primary Education” to A2 “Early Childhood Education” and A3 “Primary Education”), indicated an important transition to a more structured and coordinated model of pedagogical training (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025a; 2025b; 2025c; 2025d). These changes signaled administrative modernization and a shift in conceptual approaches to training pedagogical personnel in the context of the European Qualifications Framework and outcome-based learning.

In the theoretical dimension, modern standards perform a dual function. On the one hand, they set normative guidelines for structuring educational programs. On the other hand, they act as a tool for harmonizing national educational priorities and international requirements for teacher training (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025a; 2025d).

Therefore, the study's theoretical framework assumes that the quality of teacher training depends on the degree of consistency among standards, educational program content, and the actual learning outcomes achieved (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025a–2025d).

Analysis of educational programs for training bachelors and masters in specialties A2 “Early Childhood Education” and A3 “Primary Education” allows us to consider them as institutional models for implementing a competency-based approach (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025a; 2025b; 2025c; 2025d). In the theoretical dimension, these programs integrate three interrelated components of professional training:

1. Cognitive dimension, which provides psychological and pedagogical knowledge, methodological foundations of teaching and raising children; 2. Practice-oriented dimension, which is represented by a system of pedagogical practices, methodological courses, and applied disciplines; 3. Reflective and research dimension, which aims to develop the ability to analyze one’s own pedagogical activity.

At the bachelor's level (A2, A3), the development of basic professional competencies necessary for direct pedagogical activity in preschool and primary education institutions has become more prominent (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025a; 2025b). In contrast, the master's level is focused on deepening analytical, research, and management competencies. This, in turn, aims to ensure graduates' readiness for leadership roles, project activities, and participation in the development of educational systems (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025c; 2025d). An important element of the theoretical framework is the concept of internationalization of pedagogical education, which is considered the ability of educational programs to ensure comparability of learning outcomes, academic mobility, and professional

competitiveness of graduates (Central Ukrainian State University named after Volodymyr Vynnychenko, 2025c; 2025d).

In this sense, teacher training in specialties A2 and A3 is determined by compliance with key international guidelines. In particular, the following aspects are considered: result-oriented learning, development of transversal skills, and readiness to work in an inclusive and multicultural environment. Theoretically, it is assumed that effective integration of a graduate into the global educational space is possible if there is a balance between the national identity of pedagogical education and universal professional standards for teachers (Agbenyega & Klibthong, 2022). Therefore, within this study, the theoretical framework is based on an analytical model that combines an analysis of updated higher-education standards, educational programs for specialties A2 and A3 at the bachelor's and master's levels, and expected learning outcomes.

Modern research authors suggest that teacher training based on a competency-based approach is an important condition for the formation of specialists who can effectively respond to the dynamic challenges of modern education (Kindei et al., 2022; Kryvylova et al., 2022). In this sense, the phenomenon of competence should be considered as the ability to integrate knowledge, skills, values, and practical experience to solve complex professional tasks (Oleksenko et al., 2023; Radul et al., 2020; Radul, 2023). This should be directly correlated with the theoretical framework of this study, in which professional competence should be defined as a system that is formed in the process of combining theoretical training and practical activity. Kindei et al. (2022) pointed out the methodological training of future teachers in the digital environment. These authors emphasized the need to develop digital skills and innovative pedagogical activities. Such thoughts meet the current requirements of modern educational standards and the competency paradigm. A significant direction in modern literature is the development of children's creative skills and support qualities. Research has identified the importance of integrating creative and practical skills into the professional training of teachers. Kotelianets et al. (2021) recognized that the formation of creative skills in older preschool children based on theatrical and language activities will require special training and methodological competencies from teachers. Therefore, this confirmed the importance of developing practice-oriented competencies of future teachers in preschool education institutions (Varetska et al., 2019; Vasylykiv et al., 2022; Bradbury & Fitzgerald, 2025).

Zubalii et al. (2021) separately recognized that the integration of different types of activities made it possible to effectively develop children's creative abilities. This situation requires teachers to have the skills to plan and implement interdisciplinary educational programs.

Given the current digitalization processes, the problem of training primary school teachers in conditions of distance and blended learning is also relevant in the current scientific discourse. In particular, Androsova (2023) pointed out the training of primary school teachers for work in blended and distance learning. The author recognized that a modern teacher must be ready to use digital tools, organize remote interaction with students, and support their cognitive and emotional development. Such thoughts are generally consistent with the updated standards of higher education, in which digital competencies and the ability to adapt have become mandatory for teachers.

For this reason, innovative teaching methods and the formation of professional competencies play an important role in the development of a professional specialist. Thus, it has been proven that the implementation of innovative teaching methods is an important component of the development of professional competencies (Kim & Liang, 2022). For this reason, Androsova et al. (2023a) recognized the importance of using a lapbook as an innovative way of organizing educational activities in primary school. The authors indicated that these technologies make it possible to combine theoretical knowledge with practical activities. This, in turn, affects the development of critical thinking.

In addition, Androsova et al. (2023b) indicated that the formation of professional competence of future primary school teachers during major social and military crises requires educational programs to adapt content and methods to extreme conditions. This determined the relevance of the competency-based approach in modern pedagogical education.

Modern authors also drew attention to the importance of internationalization of pedagogical education. Educational programs that consider the comparability of learning outcomes and academic mobility contribute to the formation of professionally competitive teachers who can work in a multicultural and inclusive environment (Nisiforou & Vrasidas, 2021). Such opinions are supported by the studies of Zubalii et al. (2021), who indicated the need to train teachers to implement interdisciplinary and creative teaching methods. Thus, modern authors indicated that the training of preschool and primary school teachers based on a competency-based approach includes a combination of different dimensions, in particular: cognitive, practice-oriented, reflective-research. This indicates the importance of a systematic approach to the professional training of teachers, which will allow them to effectively integrate into the current educational space and meet the requirements of modern national and international standards.

However, despite the significant number of publications related to the professional training of preschool and primary school teachers, there are still certain gaps in the scientific literature. Many of the existing works focus on the theoretical aspects of the competence-based training of teachers or on the description of individual tools and methods. However, there is no analysis of educational programs as holistic institutional models for implementing the competence-based approach. There is also limited attention to the updated standards of Ukraine. Previous studies are focused on programs of old specialty classifications. Therefore, there are no empirical analyses of how the new specialties A2 and A3 affect the formation of professional competencies and the alignment of learning outcomes with modern national and international standards. This study aims to fill these gaps.

1.3 Research Objectives

To assess the level of formation of professional and general competencies in higher education applicants in the specialties "Preschool Education" and "Primary Education" who studied according to the updated standards of higher education.

To compare the results of professional training considering the level of higher education (bachelor's and master's) and specialty.

To analyze the relationships and predictive factors of professional readiness of future teachers through correlation and regression analysis.

2. Method

The study used a cross-sectional empirical design and aimed to determine the effectiveness of the updated higher education standards in the professional training of preschool and primary education teachers. The control cohort consisted of students trained under the previous higher education standards, whereas the comparison cohort consisted of students whose programmes incorporated the updated standards introduced in May 2025. The updated higher education standards were introduced in May 2025 and subsequently incorporated into the experimental cohort's educational programs. We collected data for the experimental cohort in March–April 2026, after approximately 10–11 months of implementing the updated standards. Thus, the assessment did not capture students immediately after the standards' introduction but reflected their experience after an extended period of study within the updated educational framework. Importantly, we did not collect data for the updated-standards cohort immediately after the formal introduction of the new standards. We surveyed participants only after they completed a substantive period of study under the revised educational programs. This ensured that the comparison reflected participants' actual exposure to the updated curriculum rather than their initial awareness of the regulatory changes. Accordingly, the study should be interpreted as a comparison between two educational cohorts exposed to different standards rather than as a randomized experiment. Because participants were not randomly assigned to conditions, observed between-cohort differences are interpreted as associations with implementation of the updated standards and not as definitive causal effects of the standards themselves.

2.1 Participants

The study included 289 participants: 242 higher education students and 47 academic staff members involved in the training of future preschool and primary education teachers. The student sample was divided into two independent cohorts according to the higher education standards under which their training was conducted. The control cohort comprised 120 students who were enrolled and trained under the previous higher education standards. Data for this cohort were collected during the 2024–early 2025 academic period, before the implementation of the updated standards. The experimental cohort comprised 122 students whose educational programmes were implemented in accordance with the updated higher education standards introduced in May 2025. Data from this cohort were collected after the participants had received training under the updated programmes. Across the two student cohorts, the sample included bachelor's and master's students in Preschool Education and Primary Education. Overall, 148 students were enrolled at the bachelor's level (88 in Primary Education and 60 in Preschool Education), while 94 students were enrolled at the master's level (48 in Primary Education and 46 in Preschool Education). In addition, 47 academic staff members participated in the qualitative and expert-assessment component of the study. These teachers were directly involved in implementing the relevant educational programmes and provided assessments of changes in learning outcomes, professional autonomy, reflexivity, and the practical orientation of teacher training. Thus, the total study sample comprised 289 participants, whereas the quantitative comparison between the control and experimental cohorts was based on 242 students. Teachers were analyzed separately and were not included in the student-level between-group statistical comparisons.

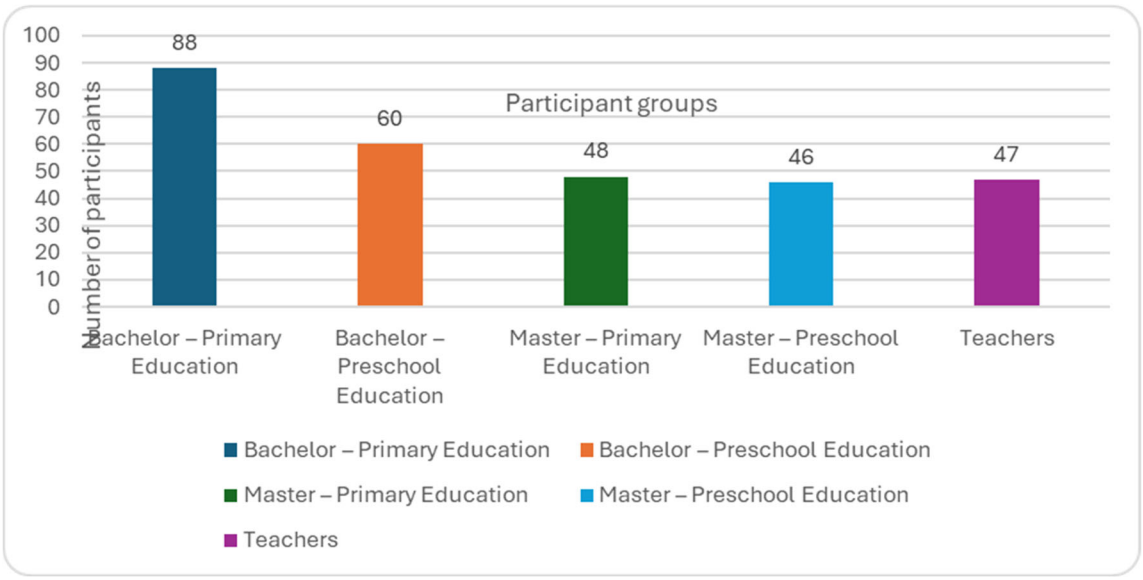


Figure 1. Structure of the Research Sample

This composition of the sample made it possible to analyze the effectiveness of the updated standards from the perspective of the learning outcomes of education seekers and the professional vision of teachers, which increases the validity and reliability of the conclusions obtained.

2.2 Instruments

To determine the effectiveness of the updated standards, tools were used to compare the results of the training of the control and experimental groups. In particular, a standardized questionnaire for students played an important role. It consisted of the same blocks of questions, which ensured the correctness of the comparison. The assessment was carried out on a five-point Likert scale.

A questionnaire for teachers (expert assessment) was also used. The tool was aimed at a comparative assessment of: changes in the learning outcomes of students; the level of their professional autonomy and reflexivity; the compliance of training with modern requirements of pedagogical practice.

At the same time, a comparative self-assessment of professional readiness was also used. Students of both groups self-assessed their own readiness for pedagogical activity according to the same criteria, which made it possible to identify the effect of the updated standards in the subjective dimension.

To ensure the reliability and validity of the data obtained, all research tools underwent expert and statistical verification procedures.

The questionnaires for applicants and teachers were evaluated by a group of 7 scientific and pedagogical experts with experience in the specialties "Preschool Education" and "Primary Education". The experts checked: the correspondence of the questions to the research objectives; the correctness of the formulations and their clarity for the respondents; the logical structure.

According to the results of the expert assessment, clarifications were made to the formulations of 5 questions, and the scale categories were optimized.

2.3 Pilot Testing

We tested the questionnaires with 15 applicants and 5 teachers who were not included in the main sample. Pilot testing allowed us to check the time for filling out the questionnaire (on average, 12–15 minutes for students and 10 minutes for teachers); the clarity and unambiguousness of the formulations (in 93% of cases, the questions were perceived correctly); and the internal consistency of the question blocks.

For the quantitative scales of the questionnaire, rated on a five-point Likert scale, internal consistency was determined using Cronbach's alpha coefficient. The reliability coefficients were as follows: $\alpha = 0.86$ for the "Professional Competencies" scale, $\alpha = 0.84$ for the "General Competencies" scale, $\alpha = 0.88$ for the "Ability to Apply Knowledge"

scale, and $\alpha = 0.85$ for the "Professional Readiness" scale. Thus, all scales demonstrated a high level of internal consistency ($\alpha \geq 0.84$), justifying their use in further quantitative analysis.

2.4 Data Analysis

Descriptive and inferential statistical methods were used to analyze the quantitative data. Specifically, for the key indicators under study—professional and general competencies, the ability to apply knowledge, and professional readiness for pedagogical activity—mean values (M), standard deviations (SD), and 95% confidence intervals (CI) were calculated.

Differences between students trained under previous and updated higher education standards were examined using tests for independent samples. Welch's t-test was used to analyze professional competencies at the level of individual components, accounting for potential differences in group variances. Effect sizes were estimated using Cohen's d and Hedges' g, with 95% confidence intervals reported where appropriate. To control for error during multiple comparisons of competency components, p-values adjusted via the Bonferroni method were used.

The interrelationship between professional and general competencies, the ability to apply knowledge, and professional readiness was analyzed using the Pearson correlation coefficient (r) in a combined sample of students ($N = 242$).

Hierarchical multiple regression analysis was conducted to determine the contribution of professional competencies and the type of higher education standard to professional readiness, while controlling for participants' educational characteristics. Professional readiness for pedagogical activity was treated as the dependent variable. Education level and specialization were included in the first block as control variables; professional and general competencies were included in the second block; and the type of standard (previous or updated) was included in the third block. Standardized regression coefficients (β), R^2, adjusted R^2, and changes in the proportion of explained variance (ΔR^2) were assessed.

To determine whether the magnitude of differences between cohorts varied depending on the components of professional competencies, the difference between effect size estimates was further analyzed using Z-tests. A bootstrapping method (5,000 iterations) was used to estimate 95% confidence intervals for the difference between effect sizes.

Mediation analysis was also conducted to test whether professional competencies served as a statistical mediator in the relationship between the type of higher education standard and professional readiness. The standard type (0 — previous standards; 1 — updated standards) was defined as the independent variable, the composite index of professional competencies as the mediator, and professional readiness as the dependent variable. Education level and field of study were included as covariates. The indirect effect was estimated using a bootstrapping method (5,000 samples) with the calculation of a 95% confidence interval. Given the non-randomized design of the cross-sectional cohort study, the mediation model was interpreted as an analysis of statistical associations rather than as evidence of a causal mechanism.

Student and faculty responses to open-ended questions were analyzed separately using thematic analysis. Open-ended responses were analyzed using an inductive thematic analysis to complement the quantitative findings and provide a more detailed understanding of participants' perceptions of changes in professional training. Of the total sample of 289 participants, 214 (74.0%) provided sufficiently complete responses to the open-ended questions and were included in the qualitative analysis. The qualitative subsample included 178 students and 36 teachers. Incomplete or non-substantive responses were excluded from the thematic analysis. The thematic analysis was conducted in several consecutive stages. First, all eligible responses were read repeatedly to ensure familiarization with the qualitative data. Second, meaningful units related to participants' perceptions and experiences of professional training were identified and assigned preliminary descriptive codes. At this stage, coding was data-driven rather than based on a predetermined set of themes. Third, conceptually related codes were grouped into broader categories reflecting recurring patterns across the responses. Fourth, these categories were compared, reviewed, and consolidated into higher-order themes according to their conceptual coherence and relevance to the research objectives. Finally, the resulting themes were checked against the original responses and refined to minimize conceptual overlap between categories. The preliminary coding framework included codes related to perceived changes in professional and general competencies, practical application of knowledge, professional autonomy, reflective practice, differences associated with education level and specialty, and readiness for pedagogical activity. These codes were subsequently grouped into broader thematic categories rather than treated as predefined analytical themes. To assess the reliability of the coding procedure, two researchers independently coded the qualitative responses using the preliminary coding framework. Inter-coder agreement was evaluated using Cohen's kappa. The resulting coefficient ($\kappa = 0.84$) indicated a high level of agreement

between the two coders. Coding discrepancies were subsequently discussed between the researchers and resolved through consensus before the final thematic structure was established. The final analysis resulted in four overarching themes: (1) perceived changes in professional and general competencies; (2) reflexivity as a central element of professional development; (3) perceived differences in professional training according to education level and specialty; and (4) professional readiness through the integration of competencies. Representative quotations were selected from the responses to illustrate the content and meaning of each theme. The qualitative findings were used primarily to contextualize and explain the quantitative results rather than to estimate the prevalence of particular perceptions in the entire study population.

2.5 Ethical Considerations

This study was reviewed and approved by the Ethics Committee of the Department of Preschool and Primary Education, Faculty of Pedagogy and Arts, Volodymyr Vynnychenko Central Ukrainian State University (Protocol No. 2 dated September 10, 2025). All participants were informed about the study's purpose and procedures, the voluntary nature of participation, the confidentiality and anonymity of the collected data, and the right to withdraw from the study at any time without consequence. Informed consent was obtained from all participants prior to data collection. The analysis and presentation of results were conducted in an anonymized form.

3. Results

The level of formation of professional and general competencies was determined based on a questionnaire survey of higher education applicants in the control and experimental groups using a five-point Likert scale.

Table 1. Level of Formation of Competencies in the Control and Experimental Groups (M ± SD)

Group	Professional competencies (M ± SD)	General competencies (M ± SD)
Control (old standards)	3.62 ± 0.54	3.75 ± 0.50
Experimental (updated standards)	4.18 ± 0.47	4.25 ± 0.45

The data obtained indicate a higher level of formation of both professional and general competencies in applicants in the experimental group.

Comparative statistical analysis to check the statistical significance of differences between groups, a t-test for independent samples was used.

Table 2. Results of Comparative Analysis

Indicator	Control (n = 120), M ± SD	Experimental (n = 122), M ± SD	t (df)	p	Cohen's d
Professional competencies	3.62 ± 0.54	4.18 ± 0.47	8.60 (234.41)	< .001	1.11
General competencies	3.75 ± 0.50	4.25 ± 0.45	8.17 (236.51)	< .001	1.05

Note. Welch's independent-samples t-test was used. Cohen's d was calculated using the pooled standard deviation.

Pearson's correlation analysis was conducted for the combined student sample (N = 242) to examine the relationships among professional competencies, general competencies, the ability to apply knowledge, and professional readiness. The purpose of this analysis was to examine the overall pattern of associations among the study variables rather than to compare correlation coefficients between the control and experimental cohorts.

As can be seen from Table 3, significant positive correlations are noticeable between all the studied indicators. In particular, the strongest relationship was recorded between the ability to apply knowledge and professional readiness ($r = 0.74$, $p < 0.01$); professional competencies and professional readiness ($r = 0.69$, $p < 0.01$).

This indicated that the effectiveness of professional training of future teachers is determined by the level of mastery of competencies and the ability to apply them in practical situations in pedagogically significant situations.

Table 3. Correlations between Key Indicators of Professional Training (r)

Variables	1	2	3	4
1. Professional competencies	1			
2. General competencies	0.64**	1		
3. Ability to apply knowledge	0.71**	0.58**	1	
4. Professional readiness	0.69**	0.62**	0.74**	1

Note: $p < 0.01$

In order to determine the predictors of professional readiness of future teachers, hierarchical multiple regression analysis was used. Professional readiness for pedagogical activity was considered the dependent variable.

In the first block of the model, control variables were introduced: level of higher education and specialty. In the second block, indicators of professional and general competencies. The third block included a variable reflecting the type of higher education standard (previous / updated) (See Table 4)

Table 4. Results of Hierarchical Regression Analysis (dependent variable — professional readiness)

Variables	Model 1 β	Model 2 β	Model 3 β
Education level	0.18*	0.09	0.07
Specialty	0.12	0.06	0.05
Professional competencies	—	0.41**	0.38**
General competencies	—	0.29**	0.26**
Standard type	—	—	0.21*
R^2	0.07	0.48	0.52
ΔR^2	—	0.41**	0.04*

Note: *p < 0,05; **p < 0,01

The results of the hierarchical regression analysis indicated that the most important predictors of professional readiness are professional competencies. However, the effect of general competencies was moderate, but significant. The inclusion of the variable of the type of higher education standard provided an additional explanation of the variability of professional readiness, indicating an independent positive effect of the updated standards (Bilyk et al., 2025).

To describe qualitative changes in the structure of professional training, professional competencies were decomposed into four components: methodological, didactic, communicative and reflective. For each component, comparisons between groups were made using the Welch t-test, 95% confidence intervals, effect sizes (Cohen's d, Hedges g) and the proportion of explained variance (η^2) were calculated. In addition, Bonferroni correction was used to control for multiple comparisons.

Table 5. Component Analysis of Professional Competencies (extended statistics)

Component	Control M ± SD	Experimental M ± SD	ΔM	t (df)	p	Cohen's d	Hedges' g	η^2
Methodical	3.58 ± 0.56	4.32 ± 0.44	0.74	11.42 (225.59)	< .001	1.47	1.47	0.37
Didactic	3.65 ± 0.52	4.18 ± 0.47	0.53	8.31 (236.74)	< .001	1.07	1.07	0.23
Communicative	3.72 ± 0.50	4.09 ± 0.50	0.37	5.76 (239.93)	< .001	0.74	0.74	0.12
Reflective	3.49 ± 0.57	4.41 ± 0.42	0.92	14.28 (218.70)	< .001	1.84	1.83	0.48

Note: p(adj) is the Bonferroni adjusted p-value.

Thus, the magnitude of the differences between the cohorts varied depending on the components of professional competence. The largest standardized difference was observed for the reflective component (d = 1.84), followed by the methodological component (d = 1.47). Significant differences were also noted in the didactic component (d = 1.07), whereas the communicative component showed a comparatively smaller, though still noticeable, difference (d = 0.74). These results indicate that the differences between students trained under the previous standards and those trained under the updated ones were particularly pronounced regarding reflective and methodological competencies. Overall, the data point to differences not only in the general level of professional competence but also in its component structure (see Figure 2).

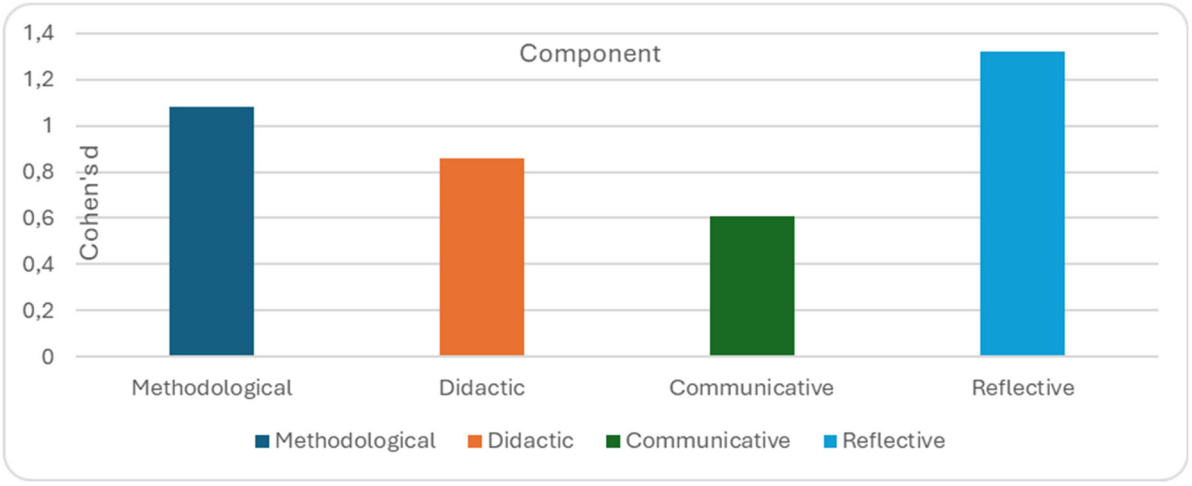


Figure 2. Effect Sizes by Component

Component-level analysis indicated that the magnitude of standardized differences between cohorts varied depending on the components of professional competence, with the greatest differences observed in reflective and methodological competencies. Given that these competence components were assessed in the same participants, no statistical comparison of effect sizes for individual components was conducted.

To investigate the relationship between the type of higher education standard, professional competencies, and professional readiness, a mediation analysis was conducted using bootstrap estimation of indirect effects (based on 5,000 samples).

The mediation model included the following variables: standard type (0 — previous standards; 1 — updated standards) as the independent variable; the integral indicator of professional competencies as the mediator; professional readiness for pedagogical activity as the dependent variable; and level of education and field of study as covariates (see Table 6).

Table 6. Results of Mediation Analysis

Path / Effect	β	SE	p	95% CI
Standard type → Professional competencies (a)	0.48	0.05	< .001	—
Professional competencies → Professional readiness (b)	0.61	0.04	< .001	—
Standard type → Professional readiness, total effect (c)	0.41*	—	—	—
Standard type → Professional readiness, direct effect (c′)	0.12	0.05	.041	—
Indirect effect (a × b)	0.29	—	—	[0.21, 0.38]

Note. Standard type was coded as 0 = previous standards and 1 = updated standards. Education level and specialty were included as covariates. The indirect effect was estimated using 5,000 bootstrap samples. The mediation results are interpreted as statistical associations rather than evidence of causal effects because of the non-randomized cohort design.

Thus, the mediation analysis revealed that professional competencies statistically mediated the relationship between the standard type and professional readiness. The magnitude of the indirect effect was 0.29 (95% bootstrap confidence interval: [0.21; 0.38]). Upon the inclusion of professional competencies as a mediator, the direct relationship between the standard type and professional readiness weakened but remained statistically significant, indicating partial statistical mediation. Given the non-randomized cohort design of the study, these results should be interpreted as evidence of statistical associations rather than as confirmation of a causal mechanism.

The study also conducted a thematic analysis of open-ended responses from students and teachers. The qualitative analysis included 214 participants (178 students and 36 teachers), representing 74.0% of the total study sample. As a result of the analysis, 4 most important themes were identified. This division was aimed at revealing the perception of the formation of professional and general competencies, differences in professional training depending on the level of education and specialty.

3.1 Perceived Changes in Professional and General Competencies

The students' responses included a statement of an increase in the level of competencies and a change in their content. In particular, competencies are described as integrated abilities that combine knowledge, skills, values, and responsibility.

“Competencies are now not just what we know, but how we think and act in a pedagogical situation” (student 12). At the same time, teachers also pointed to greater clarity and transparency of expected learning outcomes, which facilitates the assessment of students' real professional progress: “It became clearer what exactly we need to form: not separate knowledge, but readiness to work as a teacher” (teacher).

Analytical comment.

These qualitative observations explain the quantitatively recorded differences between the control and experimental groups and confirm the systemic nature of changes in the results of professional training.

3.2 Reflexivity as a Central Element of Professional Development

One of the most saturated topics was the reflective component of training. In open-ended responses, respondents often described situations in which they were required not just to complete a task, but to truly justify their own actions or pedagogical decisions. In particular, Student 56 said: “We were constantly asked to explain why we chose this particular approach and not another”

In addition, teachers noted that students began to initiate discussions of alternative pedagogical strategies. Individual teachers indicated that they demonstrated a readiness for self-analysis. “Reflection has ceased to be formal — students have begun to really analyze their mistakes” (teacher 41). Therefore, this topic can be compared with the data of the quantitative analysis, which showed the largest effect sizes for the reflective component of professional competencies.

3.3 Differences in Professional Training Depending on the Level of Education and Specialty

In open-ended responses, respondents distinguished between the nature of professional training at the bachelor's and master's levels. Master's training is described as more analytical and focused on making independent professional decisions. “At the bachelor's degree, you learn more about the basics, and at the master's degree, how to act independently in difficult situations” (student 71 of the master's level). "At the master's degree, there is more practice and independence" (student 51 of the master's level)

The perception of the specifics of training by specialty was also recorded. In particular, the training of primary education teachers is more often associated with modeling real pedagogical situations. “In primary education, there are more practical cases that can be immediately presented in the classroom” (teacher 23).

Thus, the identified qualitative assessments specify quantitative differences by level of education and specialty.

3.4 Professional Readiness through the Integration of Competencies

Respondents clearly distinguish between the concepts of “knowledge” and “professional readiness”. The latter is described as the ability to act responsibly, independently, and consciously. “Readiness is when you consciously make decisions and understand their consequences” (student 39).

Teachers emphasized that it is the level of formation of professional competencies that determines the degree of readiness of a student for pedagogical activity.

“If competencies are formed, readiness appears naturally” (teacher 15).

These opinions explained the generally strong correlations between competencies and professional readiness, as well as the results of regression and mediation analyses, which revealed professional competencies as a key mechanism of the impact of standards.

4. Discussion

This study was aimed at identifying the impact of updated standards on the quality of professional training. Accordingly, the results obtained confirm that the update of higher education standards can be associated with an increase in the quality of professional training of future teachers. This is noticeable not only at the level of general indicators of competencies, but also at the level of structural changes in the training profile (strengthening of the reflective and methodological components), as well as through the mediation mechanism (mainly through professional competencies) in the formation of professional readiness. This definition is consistent with other studies that have emphasized the role of standards and their "translation" into curricula as a key driver of professional growth.

The study indicates the general level of formation of professional and general competencies in students studying according to the updated standards. Quantitative results showed higher indicators of professional and general competencies in the group that worked according to the updated standards. Parallels can be traced in the Getenet study (2025). The author indicated that the alignment/mapping of teacher training courses with standards has implications for professional learning and the systematic construction of competencies in training programs. At the same time, a similar idea was confirmed by the data in the work of Hien & Hung (2021) and Tsekhmister et al. (2009). The authors indicated that training/training on professional standards is associated with a better understanding of the standards by preschool teachers. This is an important prerequisite for their practical application. Therefore, standards work more effectively when they become not just a formality, but a framework for professional thinking and self-orientation.

In the same context, it is appropriate to interpret the findings of Catalano et al. (2025) and Maksymchuk et al. (2018). These authors indicated that the child-centered paradigm is associated with the importance of continuous professional development. This resonates with the qualitative block obtained in the article on strengthening the practice-reflective orientation. Thus, the updated standards supported a pedagogical model in which reflection and professional autonomy are a condition for the implementation of a "child-centered" approach (Mazur et al., 2026; Shpykuliak et al., 2024).

The study also emphasized the impact of the updated standards on different professional competencies. This is also consistent with other works. Thus, different components of professional competence may be formed unevenly depending on which training domains are "loaded" in the program and how they are operationalized. In particular, Chandía et al. (2025) analyzed "knowledge profiles" in the domain of teaching numbers in future primary school teachers and indicated that competence has a profile structure and is not a homogeneous quantity. This strengthened the argument of this article about the appropriateness of component analysis (Maksymchuk et al., 2019).

It is also worth considering the digital dimension of professional training, which is increasingly considered as a "cross-cutting" component of modern standards and practices. Huong et al. (2025) indicated that digital competence is uneven in the group of teacher educators: confidence in communication/literacy is higher, and confidence in technical problem solving and new technologies is lower. This is consistent with their conclusion that the communicative component in students has a more moderate effect and may depend more on extracurricular experience and context **(**Muhonen et al., 2024; Nguyen et al., 2025; Wang & Zhang, 2024**).**

Similar emphases on IT competences of preschool/early childhood teachers are also described in other works (Kurebay et al., 2023; Saulėnienė et al., 2025). Other authors also emphasized the importance of developing training in content creation, communication, security, and problem-solving in a digital environment (Tsekhmister et al., 2024; Tsekhmister et al., 2023).

The data obtained from the correlation analysis indicated a consistent picture. It was indicated that professional competences, general competences, and the ability to apply knowledge are positively related to professional readiness. This is logically consistent with the broader literature that teachers' professional beliefs and attitudes influence practice (Haen et al., 2025; Melnyk et al., 2021; Knissarina et al., 2016). Robinson & Bond's (2025) review shows that beliefs in intelligence/mindset are potentially related to teaching practices. This supports the interpretation of the communicative and reflective dimensions as "bridges" between knowledge and action: readiness is shaped not only by knowledge, but also by reflective attitudes and professional judgments.

The article found partial mediation (the main effect of standards on readiness is mediated through professional competencies). This mediation is consistent with the approach of Getenet (2025). The author indicated that the

standard should be described as a framework that should be reflected in courses/learning experiences. After that, it manifests itself in professional learning.

The study indicated a differentiated effect of standards. The largest effects obtained are associated with the reflective and methodological components. This is generally consistent with the data of other authors who emphasized the importance of professional speech/instructional interaction and the teacher's ability to support learning through the quality of communication and pedagogical decisions. This theoretically strengthened our conclusion: standards that emphasize reflection, planning, and methodological choices increase “pedagogical quality”. At the same time, early childhood professional development programs that focus on supporting language development through play and interaction (Tsekhmister, 2024; Tympa et al., 2025) have indicated that professional development works through practices, case studies, and role models of interaction. Thus, it can be said that through the same mechanisms that “feed” the reflective-methodical profile.

The extended qualitative analysis in this article effectively served as an explanatory framework for statistical effects. Participants in the educational process described changes as an increase in practical orientation, autonomy, and reflection. These aspects have the largest effect sizes in the quantitative part. Similar data have been traced in other works (Osorio Vanegas et al., 2025; Shumetu Taye et al., 2024; Tsekhmister et al., 2024). In particular, the review by Taye et al. (2024) emphasized the importance of teachers’ perceptions of developmentally appropriate practice. This can generally be compared with the themes obtained about practical expediency, autonomy, and responsibility in choosing pedagogical strategies.

Thus, the study indicated that professional readiness is formed mainly through competencies, which supports the logic of investing in those elements of the program that translate knowledge into practice (case studies, modeling, reflective tools). It should also be noted that the assessment of student competencies was based primarily on survey results (self-assessment) and expert evaluations. In other words, it did not rely on direct indicators of professional competence derived from actual performance outcomes. Consequently, the recorded competence levels may have been influenced by the subjective perceptions and judgments of the evaluators. Future research should supplement survey data with objective assessments based on performance outcomes and observations of the learning process. In the future, it is advisable to use longitudinal designs and behavioral/performative assessment indicators. It is worth conducting detailed observations, tasks, and portfolios. In addition, the mediation model in such a design should be interpreted as theoretically justified, but not as evidence of causality. Finally, in the future, it would be worthwhile to expand the analysis of differences by level of education or specialty, incorporating measurement invariance and multigroup models.

5. Conclusions

The study analyzed the updated higher-education standards for training future teachers in the specialties "Preschool Education" and "Primary Education" using quantitative and qualitative methods. Accordingly, the study found that training aligned with the updated standards is associated with a higher level of professional and general competency development among higher education applicants. Statistically significant differences between groups are confirmed by large effect sizes. Therefore, the updated standards have the potential to improve the quality of professional training results.

The updated standards have a differentiated impact. The greatest positive changes were recorded in the reflective and methodological components. This indicates a reorientation of future teachers' professional training toward conscious pedagogical analysis.

Analysis of the relationships between key indicators of professional training showed strong and moderate positive correlations between the level of competency formation, the ability to apply knowledge, and professional readiness for pedagogical activity.

The study also shows that the updated standards primarily affect future teachers' professional readiness through qualitative changes in the system of professional competencies. The conclusions obtained can be used for further improvement of educational programs of pedagogical training and development of tools for assessment of learning outcomes. In addition, they can be used as an empirical basis for future longitudinal studies of the effectiveness of higher education standards.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed Consent

Informed consent was obtained from all participants.

Ethics Approval

This study was reviewed and approved by the Ethics Committee of the Department of Preschool and Primary Education, Faculty of Pedagogy and Arts, Volodymyr Vynnychenko Central Ukrainian State University (Protocol No. 2 dated September 10, 2025).

Data Availability Statement

Available upon request: The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Use of Artificial Intelligence

The authors used ChatGPT 5.6 solely for language editing and grammar improvement. The authors reviewed and verified all AI-assisted revisions and take full responsibility for the final content of the manuscript.

Supplementary Materials

No supplementary materials are available.

Journal Information

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