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IMPLEMENTATION OF THE BELGIAN MODEL FOR QUALITY ASSURANCE IN IT SPECIALIST TRAINING WITHIN UKRAINE'S PROFESSIONAL PRE-HIGHER EDUCATION

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Abstract

Background. The relevance of this study is driven by the protracted workplace onboarding of graduates from professional pre-higher education institutions (hereinafter: PPHEIs), which stems from rapid technological shifts in the IT sector contrasted with the slow-paced revision of applied computer science curricula; a persistent imbalance between theoretical instruction and practical training; and limited industry engagement in designing, updating, and modernizing educational programs. Addressing these challenges requires examining and adapting successful European IT training frameworks within Ukrainian PPHEIs specifically the Belgian model, which effectively bridges the theory-practice divide by directly embedding industry-specific competence frameworks (e-CF, Agoria) into the learning process.

Purpose. To substantiate actionable recommendations for adopting the advanced practices of Belgian colleges and universities of applied sciences into Ukrainian PPHEIs to elevate the quality of IT specialist training.

Methods. The study draws on the analysis and systematic synthesis of educational practices across 27 Belgian vocational institutions and universities of applied sciences (professional higher education). The research design employs comparative pedagogical analysis, textual analysis of regulatory and methodological documents (e-CF 2.0, Agoria), thematic clustering followed by analytical structuring, and comparative evaluation of quality monitoring frameworks (PDCA, CAF, PSAF, SOAR).

Results. The key dimensions of the Belgian educational quality assurance model were identified, underpinning four sets of practical recommendations for Ukrainian PPHEIs. In curriculum design, the integration of the European e-Competence Framework (e-CF) and the "Agoria 12 ICT Roles" is recommended, alongside introducing competency clusters from the first year of study through permanent employer advisory boards. Furthermore, the rationale for expanding evening and modular study formats equipped with mechanisms for the Recognition of Prior Learning and validation of non-formal/informal experience (RPL, VAE) is demonstrated. To ensure authentic learning, the study proposes instituting industry-commissioned project-based learning, engaging practitioners in building hands-on training labs, and establishing a network of "Career Observatory" centers. In quality governance, the integration of BI dashboards, learning analytics, e-portfolios, and digital quality maps is substantiated, complemented by automated faculty workload accounting (the UOTR

model) supported by dedicated quality coordinators. For student guidance and retention, institutionalizing peer tutoring is recommended, reinforced by academic success services, compensatory bridging courses, pedagogical coaching centers for industry practitioners-turned-instructors, and unified student support hubs (one-stop service centers).

Conclusions. A comprehensive adaptation of the Belgian applied model for quality enhancement will drive the systemic modernization of curricula within Ukraine's professional pre-higher education system. This strategy will establish an agile framework for cultivating competitive IT graduates who fully meet current labor market demands. Implementing the proposed recommendations curriculum modernization benchmarked against e-CF and Agoria, the expansion of project-based learning, and the digitalization of quality assurance will align PPHEI graduate training with European quality benchmarks.

Keywords: *applied computer science; Belgian colleges; e-Portfolio; business information systems; student-centered support; education; IT industry.*

Introduction. With the rapid advancement of the IT industry, the need to modernize educational programs for training applied computer science specialists in Ukrainian professional pre-higher education institutions (PPHEIs) has become increasingly critical. Currently, theoretical instruction continues to dominate the domestic educational system. Furthermore, ongoing collaboration with the business sector remains insufficient, creating a practical gap in the preparation of highly qualified graduates. This gap is becoming particularly pronounced in light of emerging industry demands, which prioritize the simulation of real-world practical tasks and the development of students' core professional competencies.

An analysis of Belgian academic literature indicates that a significant share of publications indexed in international databases such as Scopus and Web of Science focuses on IT specialist training specifically at the university level. In particular, a study by S. Kulieshov and A. Ostapenko highlighted the high efficacy of implementing simulation models, practical case studies, and interdisciplinary projects; however, their primary emphasis was placed on bachelor's degree programs in the United States. The practical track of education specifically the lack of mechanisms for adapting Belgian best practices to the operational context of domestic colleges remains largely overlooked by scholars (S. Kulieshov et al., 2025). Under these circumstances, the Belgian educational model assumes particular relevance. The experience of 27 Belgian institutions of professional pre-higher education and universities of applied sciences (professional higher education) including Karel de Grote University of Applied Sciences and Arts (KdG), HOGENT University of Applied

Sciences and Arts, UC Leuven-Limburg (UCLL), Howest University of Applied Sciences, Odisee University of Applied Sciences, Thomas More University of Applied Sciences, PXL University of Applied Sciences and Arts, Haute École Bruxelles-Brabant (HE2B), Haute École de la Province de Liège (HEPL), Haute École de la Ville de Liège (HEL), and others demonstrates a successful synergy of flexible learning pathways, quality assurance mechanisms, the "e-CF 2.0" and "Agoria 12 ICT Roles" frameworks, practice-oriented training, and data-driven governance (BI dashboards, e-Portfolios, Quality Factsheets, and the UOTR model). An integral component of this model is student support, encompassing tutoring and coaching.

The practical problem lies in the need to bridge the gap between theoretical instruction in Ukrainian PPHEIs and the real-world demands of the IT labor market. Addressing this challenge requires developing tailored quality assurance recommendations informed by the Belgian model. The purpose of this study is to substantiate and systematize actionable recommendations for modernizing educational and professional programs, quality assurance systems, and student support services in Ukrainian PPHEIs, drawing on the experience of Belgian professional higher education institutions. To achieve this purpose, the following research objectives were established: to analyze, systematize, and synthesize the practical experience of 27 Belgian institutions of professional pre-higher education and universities of applied sciences (professional higher education); to categorize Belgian educational practices into clusters based on key governance and pedagogical dimensions; and to formulate comprehensive practical recommendations

for Ukrainian PPHEIs aligned with the Belgian model.

Literature Review (Sources). Shifts in global education are rapidly giving rise to novel learning processes, pedagogical practices, and quality assurance strategies in applied computer science training. This trend is driven by dynamic business demands for competency-based frameworks and practical expertise. Contemporary international educational discourse emphasizes the integration of global and sectoral standards, primarily the European e-Competence Framework (e-CF 2.0) and the "Agoria 12 ICT Roles" taxonomy, which serve as foundational benchmarks for designing flexible educational and professional programs. International scholars have examined the potential of hands-on learning and data management tools, alongside conceptualizing multidimensional evaluation frameworks for educational environments and internal quality cultures (Verschuere et al., 2023). A vital role is played by extensive peer-tutoring and student-coaching frameworks, as well as institutional mechanisms of civic-public governance and regional university engagement (Borodiyenko, 2023a; Borodiyenko, 2023b). Publications indexed in Scopus and Web of Science concerning academic higher education substantiate the efficacy of practical problem-solving, case studies, and interdisciplinary projects in IT specialist preparation (S. Kulieshov et al., 2025). Concurrently, the vocational and practical track represented in European countries by colleges and universities of applied sciences has remained outside the scope of systemic comparative scrutiny.

The Belgian educational model warrants particular academic interest, as its modernization strategies encompass both the Flemish Region and institutions within the Wallonia-Brussels Federation (Horbatyuk & Hordiichuk, 2024; Hryhorevska, 2023; Hryhorevska, 2025). Specifically, the prerequisites and structural-functional dimensions of vocational education in Flanders were examined by Yu. Zakaulova (2018), while the facets of vocational teacher education in the Kingdom of Belgium were explored by Ye. Protsko (2015). Scholarly research has also addressed professional training for the social sector (Hryshchenko et al., 2024), organizational and legislative frameworks of inclusive education (Lohvynenko & Klym, 2021), and the structural characteristics of vocational education and training in

Belgium (Cedefop, 2021). Furthermore, the specificities of Belgium's VET quality assurance system have been analyzed in depth (Ostapenko, 2025a), followed by a comparative systematization of Belgian and Icelandic practices (Ostapenko, 2025b) and an examination of innovative technologies employed in colleges across these jurisdictions (Ostapenko, 2025c).

Unquestionably, the practical experience of Belgian colleges and universities of applied sciences merits focused inquiry. This study examines the practices of 27 Belgian institutions of professional pre-higher education and universities of applied sciences (professional higher education), including: Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, items 8, 9), Artesis Plantijn University of Applied Sciences Antwerp (Table 1, item 4), Ghent University of Applied Sciences and Arts (Table 1, item 23), UC Leuven-Limburg (UCLL) (Table 1, item 12), Howest University of Applied Sciences (Table 1, items 21, 22), Odisee University of Applied Sciences (Table 1, item 17), Thomas More University of Applied Sciences (Table 1, item 1), PXL University of Applied Sciences and Arts (Table 1, item 24), Erasmus Brussels University of Applied Sciences and Arts (Table 1, item 16), Haute École Bruxelles-Brabant (HE2B) (Table 1, item 19), Haute École de la Ville de Liège (Table 1, item 26), the network of adult education and continuing training institutions (EAFB), École Pratique des Hautes Études Commerciales (EPHEC) (Table 1, item 14), École Industrielle et Commerciale de la Province de Namur (EICPN), and Institut Technique des Aumôniers du Travail de Charleroi (Table 1, items 2, 7, 13).

The practice of these institutions integrates flexible individual learning pathways with a four-tiered competence model. It incorporates direct project-based learning tailored to IT sector demands. Employer advisory boards safeguard educational quality, e-portfolios are actively deployed, student success support centers operate systematically, and pedagogical coaching frameworks for teaching staff are established. Despite substantial scholarly contributions to comparative education, the mechanisms for adapting and implementing Belgian practical instruments within the Ukrainian educational system remain largely unexamined. Domestic colleges continue to exhibit a

predominantly theoretical instructional focus, while structured institutional collaboration with IT enterprises remains underdeveloped. This exacerbates the mismatch between graduate qualifications and current labor market requirements. This divergence stems from the tension between an objective imperative to align PPHEI training with employer demands and the lack of an actionable methodological foundation for contextualizing Belgian practices. This underlying challenge underscores the relevance of formulating actionable recommendations to modernize curricula, quality assurance mechanisms, and student support systems across Ukrainian colleges.

The empirical and primary source base of this study comprises regulatory documents, educational and professional programs, and external quality evaluation reports from 27 Belgian institutions of professional pre-higher education and universities of

applied sciences (professional higher education) specifically *Hogescholen*, *Hautes Écoles*, and adult education and continuing training institutions (EAFC). These include: Karel de Grote University of Applied Sciences and Arts (KdG), Artesis Plantijn University of Applied Sciences Antwerp, Ghent University of Applied Sciences and Arts, UC Leuven-Limburg (UCLL), Howest University of Applied Sciences, Odisee University of Applied Sciences, Thomas More University of Applied Sciences, PXL University of Applied Sciences and Arts, Haute École Bruxelles-Brabant (HE2B), Haute École de Liège, the EAFC network, École Pratique des Hautes Études Commerciales (EPHEC), École Industrielle et Commerciale de la Province de Namur (EICPN), Institut Technique des Aumôniers du Travail de Charleroi, and others. The complete inventory of reviewed reports alongside their respective web references is presented in Table 1.

Table 1.

Empirical basis of the study

No	Name of educational institution and report	Electronic link (URL)
1	Bogerd, J., Hulpiau, V., Wit, M., Van Eetvelt, K., Niels, M., De Groof, J., & Martens, V. (2025). Thomas More instellingsreview: Beoordelingsrapport [Instellingsreview]. Nederlands-Vlaamse Accreditatieorganisatie.	http://files.nvao.org/pdf/files/VL103581-24_2025-05-28_rapport.pdf
2	Cailliez, J.-C., Hage, J., & Garcia, T. (2023). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique et systèmes, orientation technologie de l'informatique: Haute École de la Ville de Liège (HEL). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_HEL.pdf
3	Cailliez, J.-C., Hage, J., & Namyst, R. (2023a). Rapport d'évaluation continue: Cluster Informatique: Bachelier en Informatique de gestion: École de Commerce et d'Informatique de Liège (ECI Liège). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_ECI.pdf
4	De Onderwijsvisite. (2014). Toegepaste Informatica: Een onderzoek naar de kwaliteit van de professioneel gerichte bachelor Toegepaste Informatica aan de Artesis Plantijn Hogeschool Antwerpen. Vlaamse Hogescholenraad.	http://files.nvao.org/pdf/files/54733596216a2_rapport%20VLUHR%20Toegepaste%20Informatica.pdf
5	Flavier, E., Brogneaux, A.-F., & Settelen, A. (2023). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion: Enseignement pour Adultes et de Formation Continue (EAFC) SudLuxembourg. Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_EAFC_Sud_Luxembourg.pdf

6	Flavier, E., Brogneux, A.-F., & Settelen, A. (2023a). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion: Enseignement pour Adultes et de Formation Continue (EAFC) FamenneArdenne. Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_EAFC_Famenne_Ardenne.pdf
7	Flavier, E., Garcia, T., & Marneffe, K. (2023b). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique et systèmes, orientation technologie de l'informatique: Ecole Industrielle et Commerciale de la Province de Namur (EICPN). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_EICPN.pdf
8	Halsberghe, E., Hulpiau, V., Lieten, I., Wit, M., Hast, T., Van der Heyden, K., & Beyls, L. (2023). Karel de Grote Hogeschool, Katholieke Hogeschool Antwerpen (KdG): Instellingsreview: Beoordelingsrapport. Nederlands-Vlaamse Accreditatieorganisatie.	http://files.nvao.org/pdffiles/NVAOVL2023253%20RAPPORT%20IR%20KdG%20(VL103572-22).pdf
9	Halsberghe, E., Hulpiau, V., Lieten, I., Wit, M., Hast, T., Van der Heyden, K., & Beyls, L. (2023a). Karel de Grote Hogeschool, Katholieke Hogeschool Antwerpen (KdG) instellingsreview: Beoordelingsrapport [Instellingsreview]. Nederlands-Vlaamse Accreditatieorganisatie.	http://files.nvao.org/pdffiles/NVAOVL2023253%20RAPPORT%20IR%20KdG%20(VL103572-22).pdf
10	Lepoivre, P., Klein, Y., & Malherbe, E. (2023). Rapport d'évaluation continue: Cluster: Informatique: Bachelier en Informatique de gestion: Enseignement pour Adultes et de Formation Continue de Mouscron Wallonie Picarde (EAFC Mouscron) en codiplômation avec Institut provincial d'Enseignement de promotion sociale Tournai – Leuze (IPEPS Tournai). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE%20EAFC%20Mouscron%20IPEPS%20Tournai.pdf
11	Lepoivre, P., Namyst, R., & De Mey, C. (2023a). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion: Ecole Supérieure des Affaires Namur (ESA). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_ESA.pdf
12	Leroy, F., Michotte, Y., Verhofstad, R., Myny, D., Ronsyn, L., Van der Weiden, M., & Beyls, L. (2024). UC Leuven & UC Limburg instellingsreview: Beoordelingsrapport [Instellingsreview]. Nederlands-Vlaamse Accreditatieorganisatie.	http://files.nvao.org/pdffiles/VL103648-23_2024-05-22_rapport.pdf
13	Mansouri, A., Falla, M., & Settelen, A. (2023). Rapport d'évaluation continue: Cluster Informatique: Bachelier en Informatique de gestion: Collège Technique des Aumôniers du Travail de Charleroi (ATC). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_ATC.pdf
14	Marneffe, K., Piton, O., & Pourcelot-Capocci, C. (2023). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion: École Pratique des Hautes Études Commerciales - École de Promotion Sociale (EPHEC-EPS). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_EPHEC_EPS.pdf

15	Marquet, P., Pecheur, C., & Al Ajroudi, A. (2023a). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion: Enseignement pour Adultes et de Formation Continue (EAFC) Namur Cadets. Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_EAFC_Namur_Cadets.pdf
16	Menendez, S., Vanhoof, J., Péters, S., De Raeve, J., Poyraz, A., Meijer, L., Aerts, I., & Provijn, D. (2025). Erasmushogeschool Brussel instellingsreview: Beoordelingsrapport [Instellingsreview]. Nederlands-Vlaamse Accreditatieorganisatie.	http://files.nvao.org/pdf/files/VL103606-24_2025-06-04_rapport.pdf
17	Nederlands-Vlaamse Accreditatieorganisatie. (2011). Onderwijsvisiteatie Toegepaste informatica en Informaticamanagement en multimedia: Een onderzoek naar de kwaliteit van de professioneel gerichte bacheloropleiding Toegepaste informatica en de professioneel gerichte bacheloropleiding Informaticamanagement en multimedia aan de Vlaamse hogescholen [Visitatierapport XIOS]. Vlaamse Hogescholenraad.	http://files.nvao.org/pdf/files/52d65e66bc479_Rapport%20XIOS%20prof-ba%20Bachelor%20in%20de%20toegepaste%20informatica.pdf
18	Pourcelot-Capocci, C., Al Ajroudi, A., & Jacquet, X. (2023b). Rapport d'évaluation continue: Informatique: Enseignement de Promotion et de Formation Continue de l'ULB et de la CCIB (EPFC). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_EPFC.pdf
19	Pourcelot-Capocci, C., Al Ajroudi, A., & Pecheur, C. (2023). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion, Bachelier Informatique et systèmes, orientation informatique industrielle, Bachelier Informatique et systèmes, orientation réseaux et télécommunications: Haute École Bruxelles-Brabant (HE2B). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_HE2B.pdf
20	Pourcelot-Capocci, C., Tang, T., & Malherbe, E. (2023a). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion, Bachelier Informatique et systèmes, orientation technologie de l'informatique: Enseignement pour Adultes et de Formation Continue (EAFC) Uccle. Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documents/RE_EAFC_Uccle.pdf
21	Sas, M., Demeulemeester, A., Koster, S., Vanhoof, J., Verleije, J., Pauwels, B., Braam, C., & Slangen, M. (2024). Hogeschool West-Vlaanderen instellingsreview: Beoordelingsrapport [Instellingsreview]. Nederlands-Vlaamse Accreditatieorganisatie.	http://files.nvao.org/pdf/files/VL103754-23_2024-06-12_rapport.pdf
22	Sas, M., Demeulemeester, A., Koster, S., Vanhoof, J., Verleije, J., Pauwels, B., Braam, C., & Slangen, M. (2024a). Hogeschool West-Vlaanderen instellingsreview: Beoordelingsrapport [Instellingsreview]. Nederlands-Vlaamse Accreditatieorganisatie	https://www.nvao.net/nl/bsluit/en/hogeschool-west-vlaanderen?type=professioneel-gerichte-bachelor&p=1&study_fields=industriële-wetenschappen-en-technologie
23	Van der Vlist, H., Van den Bogaert, C., Michotte, Y., Hajjaji, R., Cox, F., Braam, C., & Slangen, M. (2022). Hogeschool Gent	https://www.nvao.net/nl/bsluit/en/hogeschool-gent/bachelor-

	instellingsreview: Beoordelingsrapport [Instellingsreview]. Nederlands-Vlaamse Accreditatieorganisatie.	in-de-toegepaste-informatica/2544
24	Vlaamse Hogescholenraad. (2011a). Onderwijsvisitatie Toegepaste informatica en Informaticamanagement en multimedia: Een onderzoek naar de kwaliteit van de professioneel gerichte bacheloropleiding Toegepaste informatica en de professioneel gerichte bacheloropleiding Informaticamanagement en multimedia aan de Vlaamse hogescholen [Visitatierapport KdG-KHA]. Nederlands-Vlaamse Accreditatieorganisatie.	http://files.nvao.org/pdf/files/5742fb54471cb_rapport%20KdG-KHA%20prof-ba%20Bachelor%20in%20de%20toegepaste%20informatica.p df
25	Vlaamse Hogescholenraad. (2011b). Onderwijsvisitatie Toegepaste informatica en Informaticamanagement en multimedia: Een onderzoek naar de kwaliteit van de professioneel gerichte bacheloropleiding Toegepaste informatica en de professioneel gerichte bacheloropleiding Informaticamanagement en multimedia aan de Vlaamse hogescholen [Visitatierapport HUB-EHSAL]. Nederlands-Vlaamse Accreditatieorganisatie.	<a href="http://files.nvao.org/pdf/files/504eff6868904_rapport%20HUB-EHSAL%20prof-ba%20Bachelor%20in%20de%20toegepaste%20informatica.p
df">http://files.nvao.org/pdf/files/504eff6868904_rapport%20HUB-EHSAL%20prof-ba%20Bachelor%20in%20de%20toegepaste%20informatica.p df
26	Wertz, V., De Mey, C., & Garcia, T. (2023a). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion, Bachelier Informatique et systèmes, orientation informatique industrielle, Bachelier Informatique et systèmes, orientation réseaux et télécommunications: Haute École de la Province de Liège (HEPL). Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documen ts/RE_HEPL.pdf
27	Wertz, V., Garcia, T., & Marneffe, K. (2023). Rapport d'évaluation continue: Cluster Informatique: Bachelier Informatique de gestion: EAFC Colfontaine-Jurbise, EAFC Péruwelz. Agence pour l'Évaluation de la Qualité de l'Enseignement Supérieur (AEQES).	https://www.aeqes.be/documen ts/RE_EAFC_Colfontaine_Jurb ise_EAFC_Peruwelz.pdf

Джерело: складено автором.

The resulting sample encompassed institutions across diverse legal and organizational structures, ensuring the representativeness of the findings regarding quality assurance mechanisms and the operation of employer advisory boards.

Research Purpose. To substantiate practical recommendations for implementing the leading practices of Belgian colleges and universities of applied sciences into Ukrainian professional pre-higher education institutions (PPHEIs) to enhance the quality of IT specialist training.

To achieve this purpose, the following research objectives were set: to analyze the didactic and managerial practices of 27 Belgian educational institutions; to identify key quality governance mechanisms and develop universal tools for modernizing educational and professional programs; to analyze international and sectoral competence frameworks (e-CF 2.0, Agoria 12 ICT Roles); to

determine the effectiveness of utilizing Business Intelligence tools, electronic portfolios, and digital quality maps (Quality Factsheets); to investigate faculty workload calculations based on the UOTR model for objective monitoring within internal quality assurance systems; and to substantiate practical recommendations for domestic colleges.

Methods. Substantiating practical recommendations for the quality of applied computer science education necessitated a multidimensional methodological toolkit. The study was conducted using comparative pedagogical analysis, which enabled a comprehensive structural comparison between the operating principles of Belgian professional pre-higher education institutions and universities of applied sciences and the practices of Ukrainian PPHEIs. This approach revealed systemic divergences in internal quality assurance procedures

and the alignment of educational programs with business requirements.

A primary source analysis was also carried out. The research toolkit encompassed the examination of regulatory and methodological documents, curricula, and quality assurance reports. The data obtained were systematized using a clustering method, allowing the relevant practices to be categorized into five functional areas. These clusters encompass competency-based curriculum design, the implementation of project-based learning, and the digitalization of quality governance. In addition, student guidance mechanisms were examined. The methods of analytical modeling and comparative evaluation served as instruments for formulating four sets of practical recommendations for Ukrainian colleges. Through comparative analysis, techniques for contextualizing and adapting Belgian mechanisms to the domestic educational system were defined. Special emphasis was placed on examining the operation of pedagogical coaching centers for industry practitioners-turned-instructors and the functioning of student academic success support systems.

Results and Discussion. The practical recommendations developed to enhance the quality of IT specialist training in Ukrainian professional pre-higher education institutions are structured into four comprehensive blocks covering all tiers of the educational process. A cluster-based approach was applied to scientifically substantiate these recommendations, enabling the systematization of practical experiences across 27 Belgian institutions of professional pre-higher education and universities of applied sciences. Consequently, effective implementation tools were identified, and tailored quality assurance models were formulated for integration into domestic PPHEI practice.

Block 1. Competence-Framework-Driven Curriculum Design. The findings reveal that Belgian colleges structure educational trajectories around specific employer needs, departing from rigid academic conventions. Their educational programs are grounded in the explicit alignment of learning outcomes with international standards. Curricular transformation is achieved by moving away from isolated domestic norms in favor of widely recognized European professional frameworks. Within this track, an extensive body of data was

processed (Table 1, item 19), examining the practical experience of institutions including: Karel de Grote University of Applied Sciences and Arts (Antwerp) (Table 1, item 8), Artesis Plantijn University of Applied Sciences Antwerp (Table 1, item 4), Ghent University of Applied Sciences and Arts (Table 1, item 23), UC Leuven-Limburg (UCLL) (Table 1, item 12), Howest University of Applied Sciences (West Flanders) (Table 1, items 21, 22), Odisee University of Applied Sciences (Table 1, item 17), Thomas More University of Applied Sciences (Table 1, item 1), PXL University of Applied Sciences and Arts (Table 1, item 24), Erasmus Brussels University of Applied Sciences and Arts (Table 1, item 16), the Adult Education and Continuing Training Institutions (EAFC) of Colfontaine-Jurbise and Péruwelz, Haute École Bruxelles-Brabant (HE2B) (Table 1, item 19), Haute École de la Ville de Liège (Table 1, item 26), EAFC Mouscron Wallonie-Picarde, Institut Provincial d'Enseignement de Promotion Sociale de Tournai-Leuze (Table 1, item 10), Liège School of Commerce and Computer Science (ECI Liège) (Table 1, item 3), École Supérieure des Affaires de Namur (ESA) (Table 1, item 11), Centre d'Éducation et de Formation pour Adultes (Table 1, item 20), Centre de Formation et d'Éducation pour Adultes des Cadets de Namur (Table 1, item 15), EAFC Sud-Luxembourg (Table 1, item 5), the Belgian State Institution for Evening and Continuing Adult Education (Table 1, item 6), EAFC adult education and professional development institutions (Table 1, item 7), the Social Promotion School of EPHEC (Table 1, item 14), École Industrielle et Commerciale de la Province de Namur (EICPN), and Institut Technique des Aumôniers du Travail de Charleroi (Table 1, items 13, 7).

Curricula within professional higher education institutions are developed on the basis of occupational role profiles. The system employs rigorous competency assessment methodologies featuring multilevel behavioral indicators, as well as benchmarking and best-practice analysis tools. Particular emphasis is placed on balancing foundational theoretical instruction with practice-oriented learning. This involves embedding industry certifications and safeguarding academic autonomy for instructors, alongside creating effective mechanisms for flexible education tailored to working professionals (Table 1, item 2).

Cluster 1. Competency-Based Educational Program Standards. This cluster encompasses institutions of professional pre-higher education that design educational and professional programs through the adoption of international and industry-specific occupational models. Specifically, Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, item 8) structures its instructional process around specialized competencies and occupational role classifications (e.g., the "Agoria 12 ICT Roles"). Simultaneously, institution-wide cross-cutting competencies, such as "Global Competence," are integrated into curricula. In turn, Artesis Plantijn University of Applied Sciences Antwerp updates professional competencies in alignment with the European e-Competence Framework (e-CF 2.0). The institution implements an "internationalization at home" strategy and shifts toward business informatics through English-taught courses and international benchmarking (Table 1, items 4, 9). More granular competence models featuring a multilevel indicator structure across four mastery levels are deployed by Odisee University of Applied Sciences (Odisee), where corresponding skills are clustered according to defined professional roles such as developer, systems analyst, or quality assurance specialist (Table 1, item 17). A similar framework is utilized by PXL University of Applied Sciences and Arts, relying on models with thoroughly articulated behavioral indicators (Table 1, item 24). To align graduate profiles with global business requirements, Erasmus Brussels University of Applied Sciences and Arts regularly benchmarks and compares its educational programs against leading national and international counterparts (Table 1, item 16). Concurrently, Thomas More University of Applied Sciences focuses on the agile adaptation of its Applied Computer Science curricula (Table 1, item 1).

Cluster 2. Lifelong and Inclusive Vocational Education for Working IT Students. The second approach encompasses institutions designing IT specialist training programs with flexible scheduling, notably evening, modular, and four-year part-time tracks. These institutions implement mechanisms for the Recognition of Prior Learning (RPL / VAE) across formal and non-formal settings as a core quality assurance mechanism. Limburg University College / PXL implements flexible individualized

learning pathways and distance learning formats for working students, leveraging the validation of prior professional experience (Table 1, item 24). The Adult and Continuing Education Institution of South Luxembourg (EAFC Sud-Luxembourg) (Table 1, item 5) and the Belgian State Institution for Evening and Continuing Adult Education offer a four-year part-time bachelor's degree structure. This format provides evening instruction based on ECTS credit accumulation, distributing academic workloads evenly and reducing student attrition rates (Table 1, item 6). The Adult Education and Professional Development Institution provides evening courses within its Management Information Systems program, emphasizing foundational IT instruction to ensure long-term graduate adaptability (Table 1, item 7). The Social Promotion School and the Continuing Education Center at EPHEC deliver four-year evening bachelor's programs at EQF Level 6, run in parallel with short-term certificate tracks in cybersecurity, artificial intelligence, and web development to respond swiftly to industry needs (Table 1, item 14). The Industrial and Commercial School of the Province of Namur (EICPN) provides evening education with the integration of industry certifications (notably Cisco) directly into course curricula. Institut Technique des Aumôniers du Travail de Charleroi established dedicated units for the recognition of prior learning and validation of non-formal/informal experience, enabling course credit transfers and reducing completion times for employed students (Table 1, items 13, 7). The Liège School of Commerce and Computer Science (ECI Liège) offers evening training for mid- and senior-level specialists, providing modular credit transfer options from partner institutions (Table 1, item 3).

Cluster 3. Institutional Networking, Joint IT Programs, and Foundational Curricula. This area is characterized by pooling resources across multiple professional higher education institutions to deliver joint educational programs, or alternatively, establishing a common core curriculum in early study years for related IT specializations. The Adult Education and Continuing Training Institutions (EAFC) of Colfontaine-Jurbise and Péruwelz collaborate within a joint evening bachelor's program in Business Information Systems. Under this model, foundational modules are delivered independently by each institution, while internships and capstone

evaluations are conducted jointly based on an aligned SWOT analysis and a unified action plan (Table 1, item 27). Haute École Bruxelles-Brabant (HE2B) modernizes bachelor's degree programs by introducing a shared foundational first year, after which students select one of three specializations beginning in their second year. The curriculum is further reinforced by intensive English language instruction and hands-on Python training starting in the first semester (Table 1, item 19). The Liège School of Commerce and Computer Science (ECI Liège) implements a shared foundation year for cognate majors ("Industrial Computing" and "Networks and Telecommunications"). This approach ensures comprehensive grounding for first-year students and mitigates attrition under conditions of academic autonomy. Furthermore, ECI Liège establishes inter-institutional mobility mechanisms, allowing students to complete modules not offered at their home institution at partner universities, with full subsequent transfer of academic credits (Table 1, items 3, 26).

Cluster 4. Organizational and Academic Autonomy, Systemic Quality Assurance. Within the fourth approach, managerial and analytical mechanisms aimed at fostering an internal quality assurance culture are examined. These include regular curricular updating and teaching flexibility. Specifically, UC Leuven-Limburg (UCLL) adopts a three-tiered Growth Model (activity-oriented, process-oriented, and system-oriented) rather than focusing solely on the rigid attainment of key performance indicators (KPIs). Consequently, based on the outcomes of programmatic self-evaluations, supplementary methodological and financial support is allocated (Table 1, item 12). In turn, Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, item 8) employs a governance model based on "breakthrough priorities." Within this framework, faculty academic freedom is balanced with an Educational Quality Code serving as a flexible benchmark. The model provides for a cyclical four-year comprehensive curriculum review alongside an annual evaluation of instructional materials (Table 1, item 9). Howest University of Applied Sciences leverages internal analytics on admissions, student attrition, and examination results, enabling academic performance forecasting and course adjustments based on modular student feedback (Table 1, items

21, 22). Haute École de la Ville de Liège adopts international self-assessment standards, such as the Common Assessment Framework (CAF, PSAF), for long-term strategic planning, engaging alumni and IT practitioners in curriculum reviews (Table 1, item 2). École Supérieure des Affaires de Namur (ESA) and the Liège School of Commerce and Computer Science grant instructors up to 20% academic autonomy over course content, allowing for swift curricular updates in response to emerging industry trends (Table 1, items 3, 11).

Cluster 5. Practice-Oriented Learning and Implementation of Innovative Digital Technologies. This cluster brings together Belgian institutions whose activities focus on employing formative practical instructional methods, leveraging external development tools, accelerating workplace onboarding, and applying independent assessments. Ghent University of Applied Sciences and Arts actively introduces entrepreneurship programs and massive open online courses (MOOCs) to build students' practical competencies and enhance their market competitiveness (Table 1, item 23). Howest University of Applied Sciences implements bottom-up initiatives by integrating artificial intelligence (specifically GitHub Copilot) into instructional and assessment processes within its MCT program, laying the groundwork for a unified, centralized institutional AI policy (Table 1, items 21, 22). EAFC Mouscron and IPEPS Tournai implement a competency-based framework through direct project-based learning, which requires students to integrate diverse techniques and competencies during capstone assessments. EAFC Cadets de Namur and EAFC Uccle rely on the continuous curricular updating performed by instructors based on their direct professional background and insights into the business environment (Table 1, items 15, 20). Concurrently, École Industrielle et Commerciale de la Province de Namur actively engages founding bodies and regional educational authorities to sustain the practical component of its study programs (Table 1, item 7).

Recommendations for Professional Pre-Higher Education Institutions in Ukraine. To ensure the instructional quality and relevance of PPHEI educational programs, it is recommended to update curricula benchmarked against the European e-Competence Framework (e-CF) and the "Agoria 12

ICT Roles" (Table 1, items 4, 25). Establishing clear competency standards with four skill-mastery levels for each IT specialization is advisable (Table 1, item 25), alongside integrating soft-skills modules, conducting routine benchmarking against international counterparts, and involving employer advisory boards in curriculum peer reviews (Table 1, items 16, 25). To facilitate first-year student onboarding and reduce attrition, establishing a shared foundational year for cognate IT specializations is proposed. From the first semester, professional foreign language acquisition should be integrated with fundamental programming while shifting instructional emphasis toward autonomous student analytical inquiry (Table 1, item 19). To expand educational access for working professionals, colleges should introduce customized evening, modular, and four-year part-time tracks based on cumulative modular coursework (Table 1, items 5, 6, 14). Additionally, short-term certificate programs in cybersecurity, artificial intelligence, and web development should be provided (Table 1, items 7, 14), supported by dedicated units for the validation and recognition of prior non-formal learning to accelerate degree completion (Table 1, item 25).

The practical value of training will be augmented by incorporating industry certifications (such as Cisco) and MOOC courses, as well as end-to-end project-based learning embedded within capstone assessments (Table 1, items 7, 23). Colleges should actively endorse faculty-led initiatives regarding the adoption of AI and digital tools while fostering students' entrepreneurial mindsets and competencies (Table 1, items 21, 22, 23).

At the institutional governance level, it is recommended to deploy a three-tiered Growth Model for educational program development, CAF and PSAF self-assessment instruments, a cyclical four-year curriculum review process, and admissions and academic achievement learning analytics for timely course adjustments (Table 1, items 12, 21, 22, 25). To respond rapidly to technological transformations, instructors should be granted academic autonomy over up to 20% of course content (Table 1, item 15). Finally, inter-institutional collaboration should be expanded through joint educational programs, faculty exchange schemes, and shared material and technical facilities in coordination with regional educational governance authorities (Table 1, item 7).

Block 2. Practical Training and Industry Collaboration. The study of Belgian vocational and applied higher education practices indicates that cultivating highly qualified specialists is anchored in practice-oriented learning and systemic industry collaboration. Block 2 examines the experience of Belgian professional higher education institutions and universities of applied sciences: Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, items 8, 9), Artesis Plantijn University of Applied Sciences Antwerp (Table 1, item 4), Ghent University of Applied Sciences and Arts (Table 1, item 23), UC Leuven-Limburg (UCLL) (Table 1, item 12), Howest University of Applied Sciences (Table 1, item 21), Odisee University of Applied Sciences (Table 1, item 17), Thomas More University of Applied Sciences (Table 1, item 1), PXL University of Applied Sciences and Arts (Table 1, item 24), Erasmus Brussels University of Applied Sciences and Arts (Table 1, item 16), the Adult Education and Continuing Training Institutions (EAFC) of Colfontaine-Jurbise and Péruwelz, Haute École Bruxelles-Brabant (HE2B) (Table 1, item 19), Haute École de la Ville de Liège (Table 1, item 2), EAFC Mouscron, IPEPS Tournai, Liège School of Commerce and Computer Science (ECI Liège) (Table 1, item 3), École Supérieure des Affaires de Namur (ESA) (Table 1, item 11), EAFC Cadets de Namur, EAFC Sud-Luxembourg (Table 1, item 5), the Belgian State Institution for Evening and Continuing Adult Education (Table 1, item 6), EAFC adult education and professional development institutions, École Pratique des Hautes Études Commerciales (EPHEC), École Industrielle et Commerciale de la Province de Namur (EICPN), and Institut Technique des Aumôniers du Travail de Charleroi (Table 1, items 6, 7, 13, 14). Grounded in a cluster-based quality assurance approach, the practical experience of these institutions has been systematized across five functional thematic areas: partnership with the IT industry and advisory quality governance of educational programs; implementation of interdisciplinary and practice-oriented project-based learning in IT education; engagement of industry practitioners and faculty professional development; business collaboration, internships, career development, and alumni relations; and modernization of material, technical, laboratory, and digital infrastructure (Table 1, item 26).

Cluster 1. Partnership with the IT Industry and Advisory Quality Governance of Educational Programs. The primary mechanism for ensuring educational quality in Belgian colleges is the establishment of permanent advisory boards that actively engage stakeholders in designing and monitoring educational and professional programs. Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, items 8, 9) and AP University of Applied Sciences and Arts Antwerp have instituted Advisory Boards and Professional Field Committees. These advisory bodies bring together industry representatives, alumni, and faculty to continuously monitor labor market requirements, enabling dynamic curricular adjustments aligned with operational industry demands (Table 1, item 4). Analogous advisory boards operating in close synergy with IT clusters are documented at Odisee University of Applied Sciences, where systematic international benchmarking prevents curricular obsolescence and ensures ongoing relevance (Table 1, item 17). The practices of PXL University of Applied Sciences and Arts, Erasmus Brussels University of Applied Sciences and Arts, and Thomas More University of Applied Sciences corroborate the necessity of engaging professional associations, employment agencies, and enterprise councils in peer-reviewing teaching materials, evaluating projects, and assessing student competencies (Table 1, item 24). Furthermore, Thomas More University of Applied Sciences has embedded validated employer and graduate survey instruments directly into its institutional information system (Table 1, item 1). At Haute École de la Ville de Liège, direct internship supervisors participate in conducting differentiated SWOT analyses of the instructional process, while at EPHEC (Brussels), strategic partnership is formally anchored at the executive governance level through the inclusion of Brussels Chamber of Commerce and Université Libre de Bruxelles representatives on its board of directors (Table 1, items 2, 19).

Cluster 2. Project-Based Learning and Interdisciplinarity in IT Education. The Belgian practice-oriented educational model replaces abstract theoretical exercises with authentic case studies commissioned by industry partners. Karel de Grote University of Applied Sciences and Arts (KdG) engages students in solving genuine practical problems, such as software testing and designing

applied pictographic IT solutions for individuals with disabilities (Table 1, items 8, 9). Artesis Plantijn University of Applied Sciences Antwerp implements end-to-end project work across every semester, culminating in a 30-ECTS capstone project addressing corporate challenges (Table 1, item 4). The practices of Hogeschool PXL, Erasmus Brussels University of Applied Sciences and Arts, and Odisee University of Applied Sciences integrate technology engineering with soft skills development and business communication (Table 1, item 17). At EAFC Colfontaine-Jurbise and Péruwelz, hands-on training is reinforced through inter-bachelor projects centered on sustainable development alongside integration with international Cisco Academy programs (Table 1, item 27). Active learning methodologies such as flipped classrooms, cross-curricular projects, and collaborative knowledge-sharing platforms are utilized by the Liège School of Commerce and Computer Science, while École Supérieure des Affaires de Namur integrates capstone learning through an Integration and Development Project (Table 1, item 3).

Cluster 3. Engaging Industry Practitioners and Faculty Professional Development. The transfer of applied industry expertise into the academic environment is achieved by actively recruiting experts from specialized enterprises. A prime example is École Supérieure des Affaires de Namur, where approximately 80% of faculty members combine teaching with active professional employment in the real sector of the economy. Similar models involving adjunct faculty and guest lecturing are widely observed across PXL University of Applied Sciences and Arts, EAFC Mouscron, IPEPS Tournai, EAFC adult education centers, École Industrielle et Commerciale de la Province de Namur, and Institut Technique des Aumôniers du Travail de Charleroi (Table 1, items 7, 24). Alongside recruiting external professionals, Belgian educational institutions provide systemic institutional support for the professional and scholarly development of their faculty. Specifically, UC Leuven-Limburg (UCLL) established the VODO framework, granting instructors researcher status with one dedicated day per week allocated exclusively to applied R&D (Table 1, item 12). Ghent University of Applied Sciences and Arts operates specialized centers that relieve faculty of administrative burdens to foster

educational and scientific inquiry, while Institut Technique des Aumôniers du Travail de Charleroi carries out applied studies in close institutional partnership with UCLouvain (Table 1, items 13, 23).

Cluster 4. Industry Engagement, Internships, and IT Career Support. Student workplace integration is facilitated through specialized platforms, structured internships, and active alumni communities. Specifically, Howest University of Applied Sciences cultivates the "MCT – Business Network" initiative, founded by alumni to pitch student projects directly to prospective employers. Concurrently, the Liège School of Commerce and Computer Science (ECI Liège) runs a "Career Observatory" and career fair days, enabling prompt curriculum feedback and calibration (Table 1, items 21, 22, 26). At Haute École Bruxelles-Brabant (HE2B), industry immersion begins during early induction via professional interviews, CV-building modules, and engagement with research cells. In contrast, EAFC Sud-Luxembourg emphasizes professional networking and LinkedIn monitoring, whereas the Belgian State Institution for Evening and Continuing Adult Education makes independent internship procurement a mandatory degree prerequisite (Table 1, items 5, 6). Across institutions such as EPHEC, the Continuing Education Center at ULB, and ECI Liège, internships are rigorously synchronized with management coursework and capstone projects, featuring dedicated faculty on-site visits to host enterprises (Table 1, item 14).

Cluster 5. Modernization of the Material and Technical Infrastructure in Applied Higher Education IT Training. Hands-on student training across Belgian professional higher education institutions and universities of applied sciences relies on state-of-the-art infrastructure, with students actively participating in its operational maintenance. Specifically, UC Leuven-Limburg (UCLL) officially employs students within its internal IT departments and integrates them into applied research conducted in specialized XP-Lab facilities (Table 1, item 12). Systematic computer laboratory upgrades, interactive whiteboard procurement, and specialized software acquisitions are maintained by EAFC Cadets de Namur (Table 1, item 15). Meanwhile, technical re-equipment at EAFC Mouscron and IPEPS Tournai is financed through public-private enterprise partnerships (Table 1, item 15). In parallel, Haute

École de la Ville de Liège routinely conducts digital infrastructure needs audits, outfitting lecture halls with virtual reality (VR) headsets to advance multimodal learning environments (Table 1, item 2).

Recommendations for Professional Pre-Higher Education Institutions in Ukraine. To ensure a high standard of quality assurance in IT educational and professional programs, Ukrainian professional pre-higher education institutions (PPHEIs) are advised to introduce executive advisory mechanisms through strategic partnerships with the IT sector. A critical measure involves establishing permanent advisory boards comprising representatives of IT clusters, employers, and alumni to conduct systematic expert review and continual updating of educational and professional programs (Table 1, items 4, 25). Internal quality assurance systems should incorporate standardized employer surveys, differentiated SWOT analyses of the educational process, and the appointment of industry experts to governing boards and educational administration bodies (Table 1, items 1, 2, 18).

Invigorating hands-on training requires moving away from abstract assignments toward applied projects directly commissioned by the IT industry, such as developing assistive solutions for individuals with special needs and testing commercial software products (Table 1, item 8). The learning process should be structured around semester-long project work culminating in integrated capstone assignments based on authentic corporate cases (Table 1, item 4). Favorable conditions must be established for the simultaneous development of hard and soft skills. A key step is leveraging Cisco platforms, adopting flipped classroom models, and implementing capstone integration and development projects (Table 1, items 3, 25, 27).

High teaching quality should rely on engaging IT practitioners through adjunct positions and guest lectures (Table 1, items 7, 25). For full-time academic staff, it is recommended to introduce "teaching researcher" status with dedicated timetable slots allocated for applied R&D, establish internal educational development centers to conduct pedagogical research, and pursue joint research initiatives with academic universities (Table 1, items 12, 13, 23).

Industry orientation entails immersing students in the professional ecosystem from their first

year of study via specialized career planning modules, alumni-driven business networks, and job fair events (Table 1, items 21, 26). It is essential to cultivate proactive skills for independently securing internship placements and leveraging LinkedIn (Table 1, item 5). Senior-year internships should be aligned with capstone projects under a tripartite mentoring model: instructor – student – employer (Table 1, item 14). The modernization of instructional and laboratory facilities should be executed through public-private partnerships with IT enterprises (Table 1, item 2). To provide early practical experience, institutions should consider employing students within internal IT departments and involving them in specialized laboratories (Table 1, item 12). Scheduled updates of hardware, licensed software, and the deployment of advanced digital tools such as VR headsets for multimodal learning must also be ensured (Table 1, items 2, 15).

Block 3. Data-Driven Governance and Internal Quality Assurance in IT Education. Belgian professional higher education institutions (colleges and universities of applied sciences) are systematically transforming governance models, shifting away from formalistic compliance monitoring toward comprehensive quality systems and deep digitalization. This practice integrates competency-based criteria, big data analytics, and agile digital environments, while fostering instructional alignment and internal self-regulation. Data management is anchored in objective assessment: Karel de Grote University of Applied Sciences and Arts (KdG) and Odisee University of Applied Sciences evaluate student competencies through e-portfolios (Table 1, items 8, 9, 17). AP University of Applied Sciences and Arts Antwerp utilizes external independent evaluators and cross-peer review of examinations (Table 1, item 4), while team-based assessment and standardization have been instituted by the Continuing Education Center at ULB and École Pratique des Hautes Études Commerciales (EPHEC). Concurrently, Haute École de la Ville de Liège monitors academic progress using progress tracking files, Microsoft Teams, and standardized rubrics (Table 1, items 2, 14).

A second key trajectory is automated analytics, enabling data-driven decision-making. Specifically, Ghent University of Applied Sciences and Arts and Thomas More University of Applied

Sciences deploy Business Intelligence (BI) platforms for benchmarking and quality control (Table 1, items 1, 23), while Howest University of Applied Sciences integrates learning analytics and KPI dashboards ("holocards"). In contrast, Erasmus Brussels University of Applied Sciences and Arts regards quantitative indicators solely as an auxiliary mechanism (Table 1, items 16, 21, 22), while EAFC Cadets de Namur manages scheduling and module delivery via the ENORA database (Table 1, item 15). The digitalization of faculty tracking optimizes workload planning: UC Leuven-Limburg (UCLL) implements the UOTR system to calculate workloads factoring in grading, student feedback, and scientific research (Table 1, item 12). Moreover, cumbersome accreditation dossiers have been superseded by concise internal quality factsheets, while HOGENT University of Applied Sciences and Arts and Haute École Bruxelles-Brabant (HE2B) successfully minimize administrative bureaucracy through digital management and RACI matrices.

Digital infrastructure is growing increasingly adaptable: Howest University of Applied Sciences implements "plug-and-play" architectures alongside Copilot AI tools (Table 1, items 21, 22); BYOD (Bring Your Own Device) policies paired with Moodle are utilized by EAFC Colfontaine-Jurbise and Péruwelz (Table 1, item 27); and hybrid delivery models are operational at EAFC Mouscron, IPEPS Tournai, ESA, and the Liège School of Commerce and Computer Science (ECI Liège). In turn, EAFC Sud-Luxembourg established a unified digital workspace based on Microsoft Teams, Office 365, and electronic document management (EDM) (Table 1, item 5); cross-campus instructional alignment is ensured by the Belgian State Institution for Evening and Continuing Adult Education (Table 1, item 6); and EAFC adult education centers invest directly in specialized software and personal computing stations. Multichannel communication via Moodle, Teams, and Discord has been established by the Continuing Education Center at ULB and École Industrielle et Commerciale de la Province de Namur (EICPN) (Table 1, item 7). Quality governance is grounded in the PDCA cycle at PXL University of Applied Sciences and Arts; KdG relies on its proprietary Quality Code and the KdG Academy (Table 1, item 24); ECI Liège utilizes pedagogical support units and continuous assessment mechanisms

(SOD); Haute École de la Ville de Liège (HEL) utilizes a Quality Process Manual (MPQ) and publishes "Quality News"; and designated roles for autonomous quality coordinators have been established across EAFC Colfontaine-Jurbise and Péruwelz, ECI Liège, EAFC adult education centers, EICPN, and Institut Technique des Aumôniers du Travail de Charleroi (Table 1, item 7).

Cluster 1. Information-Analytical Systems for Educational Quality Governance and Assessment. This category comprises higher education institutions that systematically leverage big data analytics, Business Intelligence (BI) technologies, and data-driven decision-making (DDDM) principles. Prominent among them are Ghent University of Applied Sciences and Arts (Table 1, item 23), Thomas More University of Applied Sciences (Table 1, item 1), Howest University of Applied Sciences, Erasmus Brussels University of Applied Sciences and Arts, and EAFC Cadets de Namur. The practical experience of these institutions centers on developing unified BI dashboards and integrated institutional databases (notably ENORA). Such tools facilitate real-time monitoring of key metrics admissions dynamics, academic performance, time-to-degree, and survey outcomes thereby ensuring objective cross-program evaluation. This approach empowers leadership to make informed governance decisions grounded in comprehensive analytical synthesis rather than isolated quantitative metrics (Table 1, items 15, 16, 21, 22).

Cluster 2. Digitalization of Competency-Based Assessment and Knowledge Verification Standards. This domain encompasses professional higher education institutions specializing in competency-based frameworks, e-portfolio digitalization, and innovative assessment standards. Notable examples include Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, items 8, 9), Odisee University of Applied Sciences (Table 1, item 17), Artesis Plantijn University of Applied Sciences Antwerp (Table 1, item 4), the Continuing Education Center at ULB, EPHEC, and Haute École de la Ville de Liège (Table 1, items 2, 14). The track record of this cohort demonstrates a solid transition from traditional theoretical testing to the multifaceted evaluation of authentic professional competencies. Core mechanisms include transparent student e-portfolios and the involvement of external

independent examiners to validate the reliability of examination procedures. This is complemented by peer review of assessment tasks, collaborative course design, and collegial grading on specialized subjects.

Cluster 3. Digital Transformation of the Educational Environment and IT Infrastructure. This area covers Belgian professional higher education institutions (colleges and universities of applied sciences) systematically pursuing holistic environmental digitalization through hybrid learning modalities, modern LMS platforms, and robust IT infrastructure. This group comprises Howest University of Applied Sciences (Table 1, items 21, 22), several adult education and continuing training institutions (EAFC Colfontaine-Jurbise, Péruwelz, Mouscron, etc.), IPEPS Tournai, the Liège School of Commerce and Computer Science (ECI Liège) (Table 1, item 3), École Supérieure des Affaires de Namur (ESA) (Table 1, item 11), EAFC Cadets de Namur (Table 1, item 15), EAFC Sud-Luxembourg (Table 1, item 5), the Belgian State Institution for Evening and Continuing Adult Education (Table 1, item 6), EAFC adult education centers, and École Industrielle et Commerciale de la Province de Namur (EICPN) (Table 1, item 7). In practice, "plug-and-play" approaches have proven highly effective in accelerating the integration of digital services and artificial intelligence tools (Copilot). Institutions actively pair BYOD policies with Moodle, Smartschool, and Microsoft Teams platforms, alongside deploying electronic document management (EDM) systems. For working students, agile asynchronous resources such as podcasts are developed, underpinned by dedicated technical support and licensed software distribution.

Cluster 4. Internal Quality Assurance and Faculty Performance Monitoring. This cluster comprises professional higher education institutions actively developing internal quality systems and optimizing faculty teaching workloads through collaborative governance and support networks. It includes Limburg University College / PXL (Table 1, item 24), Karel de Grote University of Applied Sciences and Arts (KdG), UC Leuven-Limburg (UCLL), HOGENT University of Applied Sciences and Arts, Haute École Bruxelles-Brabant (HE2B) (Table 1, item 18), Haute École de la Ville de Liège (HEL), ECI Liège, EICPN, EAFC adult education centers (Table 1, item 7), and Institut Technique des

Aumôniers du Travail de Charleroi (ATC) (Table 1, items 13, 26). The operational practice of these institutions is grounded in the international PDCA quality cycle, complemented by the RACI matrix for clear delegation of responsibilities. Internal academies and specialized pedagogical and digital support hubs are embedded within the institutional ecosystem. Furthermore, institutions designate autonomous quality coordinators with dedicated operational time-allocations and engage auxiliary support staff to alleviate administrative burdens on faculty. Management workflows are augmented by flexible workload calculation models (UOTR) and publicly accessible quality factsheets. Students participate directly in monitoring via continuous assessment surveys (SOD), while institutions establish enduring inter-institutional consortia to conduct joint audits.

Recommendations for Professional Pre-Higher Education Institutions in Ukraine. Practical recommendations drawn from the Belgian experience encompass four key priority areas: systemic data governance, digitalization, infrastructural provision, and internal self-evaluation. Ukrainian PPHEIs should deploy Business Intelligence (BI) dashboards and centralized institutional databases modeled after the ENORA system. This will enable real-time aggregation of quantitative and qualitative indicators (admissions, academic attainment, time-to-completion, and survey feedback), thereby facilitating inter-program comparative benchmarking. Such an approach fosters sound, evidence-based managerial decision-making rather than reliance on isolated statistical figures (Table 1, items 1, 15, 16, 23). The next critical step entails transitioning from theoretical knowledge testing to comprehensive competence-based evaluation through transparent student e-portfolios. Involving independent external examiners to verify exam reliability, introducing peer review of assessment tasks among faculty, collaborative course design, and collegial evaluation across thematic categories offer tangible practical value (Table 1, items 2, 4, 8).

Professional pre-higher education institutions should effectively apply the "plug-and-play" concept to accelerate the integration of digital services and artificial intelligence tools (such as Copilot). It is essential to combine BYOD (Bring Your Own Device) policies with modern LMS platforms

(Moodle, MS Teams) and electronic document management (EDM) systems. For students combining study with employment, developing flexible educational resources and ensuring direct access to computing hardware and licensed software for all academic participants is strongly advised (Table 1, items 5, 21, 27).

To enhance the efficacy of internal quality assurance, institutions should rationally implement the PDCA cycle, the RACI responsibility assignment matrix, and workload accounting methodologies modeled after UOTR (accounting for time dedicated to formative student feedback and digital course development). Dedicated roles for autonomous quality coordinators should be established with allocated working hours, alongside founding pedagogical and digital instructional development centers and academies, publishing accessible quality factsheets, conducting student surveys (the SOD system), and establishing inter-institutional consortia for collaborative quality audits (Table 1, items 7, 13, 18, 25).

Block 4. Inclusive Educational Environment and Psychological-Pedagogical Student Support. The Belgian experience in organizing education across professional higher education institutions and universities of applied sciences illustrates a major paradigm shift in educational principles: a steady transition from passive knowledge acquisition toward the cultivation of an adaptive, student-centered ecosystem. This paradigm encompasses not only didactic aspects, but also comprehensive psychological-pedagogical, social, and digital support throughout the entire student life cycle. At the core of the Belgian model lie student trust, enhanced learner autonomy, and active student involvement in institutional decision-making. The practical implementation of these principles is validated by leading Belgian professional higher education institutions, including Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, item 8), Artesis Plantijn University of Applied Sciences Antwerp (Table 1, item 4), HOGENT University of Applied Sciences and Arts (Table 1, item 23), UC Leuven-Limburg (UCLL) (Table 1, item 12), Howest University of Applied Sciences (Table 1, items 21, 22), Odisee University of Applied Sciences (Table 1, item 17), Thomas More University of Applied Sciences (Table 1, item 1), Limburg University

College / PXL (Table 1, item 24), and Erasmus Brussels University of Applied Sciences and Arts (Table 1, item 16).

This network of pioneering institutions further includes the Adult Education and Continuing Training Institutions (EAFC) of Colfontaine-Jurbise and Péruwelz (Table 1, item 27), Haute École Bruxelles-Brabant (HE2B) (Table 1, item 18), Haute École de la Province de Liège (HEPL) (Table 1, item 26), Haute École de la Ville de Liège (HEL), EAFC Mouscron, IPEPS Tournai, Liège School of Commerce and Computer Science (ECI Liège) (Table 1, item 3), École Supérieure des Affaires de Namur (ESA) (Table 1, item 11), EAFC Uccle (Table 1, item 18), as well as adult continuing education centers: Cadets de Namur (Table 1, item 15), Sud-Luxembourg (Table 1, item 5), Famenne-Ardenne (Table 1, item 6), and Evere (Table 1, item 7). The network is complemented by École Pratique des Hautes Études Commerciales (EPHEC), École Industrielle et Commerciale de la Province de Namur (EICPN), and Institut Technique des Aumôniers du Travail de Charleroi (Table 1, items 6, 7, 13, 14). The operations of these institutions demonstrate that student-centeredness functions as an integrated ecosystem harmoniously combining mentorship, learning analytics, flexible learning trajectories, and comprehensive digital scaffolding.

Cluster 1. Student Tutoring and Peer-to-Peer Support in First-Year Onboarding. Fostering a supportive onboarding environment in Belgian professional higher education institutions and universities of applied sciences relies on the systematic expansion of student mentorship. Within this framework, senior students provide continuous coaching and guidance to incoming first-year students. Specifically, at Karel de Grote University of Applied Sciences and Arts (Table 1, items 8, 9) and Limburg University College / PXL, first-year students participate in collaborative integration weeks where tutors assist them in smoothly integrating into the academic community (Table 1, item 24). The experience of Odisee University of Applied Sciences and Erasmus Brussels University of Applied Sciences and Arts demonstrates that coupling tutoring with e-portfolio tracking significantly reduces early attrition and enables the prompt remediation of learning deficits (Table 1, item 17). At Haute École Bruxelles-Brabant (HE2B) and

EPHEC, senior students are actively engaged in facilitating preparatory tutorials under faculty supervision (Table 1, item 14). Meanwhile, at the Liège School of Commerce and Computer Science, peer support is realized through informal digital platforms for peer-to-peer tutoring, ensuring rapid student onboarding without administrative overhead.

Cluster 2. Knowledge Leveling Mechanisms and Institutional Academic Success Support. Ensuring equitable learning opportunities requires implementing flexible bridging courses and progressively structuring academic workloads. Specifically, Erasmus Brussels University of Applied Sciences and Arts provides compensatory "bridging" courses in foundational subjects (notably programming), effectively mitigating disparities in entrants' prior academic preparation. Haute École Bruxelles-Brabant (HE2B) employs a "funnel approach" (*approche en entonnoir*), spreading labor-intensive courses across an extended timeframe to alleviate first-year academic stress. In turn, the Liège School of Commerce and Computer Science (ECI Liège) implements a shared foundation year for cognate specializations (Table 1, item 26), allowing first-year students to adapt to the academic environment and make an informed choice regarding their specific concentration, while concurrently organizing STEAM outreach and career-orientation events in secondary schools. At Haute École de la Ville de Liège and the Belgian State Institution for Evening and Continuing Adult Education, a central role is played by a dedicated Student Success Support Service (Table 1, items 2, 6), which organizes preparatory study sessions, individual advisory consultations, and workshops focused on overcoming procrastination and developing effective study methodologies. Additionally, EAFC adult education centers traditionally conduct early-year induction sessions and projects aimed at developing soft skills and social interaction, notably within the DuoForJob initiative (Table 1, item 7).

Cluster 3. Digital Data Analytics in Student Assessment and Guidance. Belgian professional higher education institutions (colleges and universities of applied sciences) actively deploy data analytics and modern Business Intelligence (BI) tools to make sound pedagogical and managerial decisions. Specifically, at Howest University of Applied Sciences, analytical data empowers instructors to

deliver differentiated mentoring, issue targeted notices, and provide real-time feedback during formative assessment. Post-examination session analyses compiled into reports establish an objective basis for tailored student advising on specialization tracks. At Erasmus Brussels University of Applied Sciences and Arts, BI tools are successfully utilized to investigate attrition drivers and evaluate educational quality. To prevent "survey fatigue," UC Leuven-Limburg (UCLL) has optimized survey frequency, scheduled dedicated academic slots for completion, and routinely engages specialized focus groups and sounding boards ("resonance groups"). At Thomas More University of Applied Sciences and AP University of Applied Sciences and Arts Antwerp, the deep integration of surveys and semesterly focus groups into institutional information systems guarantees rapid feedback regarding instructional content and workload distribution (Table 1, item 1). Concurrently, Ghent University of Applied Sciences and Arts completely aligns its digital transformations with student-centric priorities (Table 1, item 23), while at Karel de Grote University of Applied Sciences and Arts (KdG), the Continuing Education Center at ULB, and École Industrielle et Commerciale de la Province de Namur (EICPN), institutional communication combines official student councils with informal communication channels (Discord, Moodle, Teams) to maintain an ongoing, responsive dialogue (Table 1, item 5).

Cluster 4. Flexible Organization of the Educational Process within Lifelong Learning. The organization of educational delivery in adult education institutions is tailored to achieve maximum scheduling flexibility, enabling students to successfully balance academic studies with professional responsibilities. Specifically, across the Adult Education and Continuing Training Institutions (EAFC) of Colfontaine-Jurbise, Péruwelz, and Uccle (Table 1, item 20), EAFC Cadets de Namur, and École Industrielle et Commerciale de la Province de Namur (EICPN), evening and modular bachelor's degree tracks (notably in Business Information Systems) have been instituted, spanning 3–4 evenings per week over a four-year duration (Table 1, item 7). Holistic student support in these settings is spearheaded by section coordinators, who maintain instructional cohesion across the teaching team, devise optimized schedules, and ensure centralized

access to course materials via the Moodle platform. École Supérieure des Affaires de Namur operates an effective performance monitoring system combined with one-on-one advising and flexible assessment schedules for working students. This approach enables timely identification and mitigation of early indicators of disengagement (particularly through attendance analytics). Furthermore, students are afforded the flexibility to adapt their academic workloads and extend study timeframes according to their individual circumstances and needs.

Cluster 5. Tutoring during Practical Training, Career Counseling, and Alumni Relations. The organization of work-based learning and internships in Belgian educational practice is underpinned by well-structured pedagogical guidance and mentorship. Specifically, the Adult Education and Continuing Training Institutions (EAFC) in Mouscron and IPEPS Tournai have instituted mandatory internship logbooks and comprehensive student supervision spanning from the selection of the host enterprise to the successful defense of the capstone report. At Institut Technique des Aumôniers du Travail de Charleroi, instructors are officially allocated dedicated workload hours to assist students in securing internship placements and preparing application dossiers. Meanwhile, at the Liège School of Commerce and Computer Science (ECI Liège) and École Industrielle et Commerciale de la Province de Namur (EICPN), faculty provide continuous advisory support, regarding internships as a cornerstone for integrating students into the real economic sector. Furthermore, the experience of the Adult Education and Continuing Training Institution (Table 1, item 7) demonstrates the high efficacy of systematically engaging alumni via professional networks (LinkedIn, Facebook) for mentorship, networking, and facilitating the employment of subsequent student cohorts (Table 1, item 6).

Cluster 6. Pedagogical Mentorship and Methodological Support for Academic Staff. The quality of student-centered support hinges on the pedagogical readiness and methodological support provided to teaching staff, particularly recruited industry practitioners. At EAFC Cadets de Namur and École Pratique des Hautes Études Commerciales (EPHEC), specialized internal structures dedicated coaching units and peer mentoring frameworks are operational (Table 1, item 14). These units provide

methodological onboarding, coaching, and instructional support for novice instructors and IT industry experts lacking formal pedagogical qualifications. At Haute École de la Ville de Liège (HEL), analogous functions are performed by the Pedagogical Support Unit (*Cellule d'appui pédagogique*), which collaborates with the Student Success Support Service and pedagogical councils to drive continuous refinement of instructional methodologies (Table 1, item 2).

Cluster 7. Development of a Barrier-Free Environment and Organizational-Digital Support Services. Fostering a supportive and accessible educational environment relies on the development of specialized infrastructure. Karel de Grote University of Applied Sciences and Arts (KdG) (Table 1, item 8) operates an integrated inclusion and diversity framework overseen by a dedicated coordinator, while physical and digital student support hubs known as "STIP" (Student Information Point) operate across its campuses (Table 1, item 9). At EAFC Sud-Luxembourg, the Success Support and Inclusion department works in close alignment with the quality assurance unit (Table 1, item 5). The Belgian State Institution for Evening and Continuing Adult Education and the Continuing Education Center at ULB equip students with computing equipment, livestream classes for individuals with limited mobility or challenging life circumstances, and ensure physical accessibility through ramps and elevators (Table 1, item 6). Howest University of Applied Sciences warrants particular attention for developing a dedicated digital application for international students; integrated with municipal services, it accelerates the processing of residence permits and resolves daily living inquiries.

Recommendations for Professional Pre-Higher Education Institutions in Ukraine. Recommendations for Ukrainian PPHEIs entail establishing a comprehensive student mentoring system. Engaging senior students in onboarding weeks, peer-to-peer tutoring, and introductory tutorial sessions is advisable. Combining tutoring with progress tracking via e-portfolios minimizes the risk of academic attrition and mitigates gaps in students' foundational vocational preparation (Table 1, items 8, 9, 14, 25). Institutions should introduce remedial bridging courses in foundational IT disciplines, apply the "funnel approach" to stagger

academic workloads, and implement a shared core curriculum in the first year for cognate specializations. Curricular mastery should be reinforced by Student Success Services through leveling consultations, anti-procrastination workshops, and soft skills development initiatives (Table 1, items 2, 6, 7, 26). In addition, BI tools should be deployed to analyze academic outcomes and identify drivers of student dropouts. To mitigate survey fatigue, institutions should optimize survey frequency, designate dedicated class time for feedback collection, conduct focus groups, and leverage digital communication platforms (Discord, Moodle, Teams) for prompt dialogue (Table 1, items 1, 5, 23).

Enhancing the quality of education for employed students requires introducing evening and modular study tracks, pacing curricula across extended timelines, tracking learner engagement, and providing dedicated coordination via LMS Moodle (Table 1, items 7, 15, 20). Practical orientation is augmented through mandatory internship logbooks, allocating dedicated faculty hours for internship supervision, and engaging alumni (via LinkedIn and Facebook) in mentorship and networking (Table 1, items 6, 7, 13, 26). To guarantee instructional excellence, establishing internal coaching units and Pedagogical Support Services is essential, providing methodological onboarding and mentorship to industry practitioners lacking formal teaching credentials (Table 1, items 2, 14). Furthermore, expanding one-stop support points (STIP) and inclusion offices is crucial. Institutions must provide students with computing equipment, livestreamed classes, and architectural accessibility, while exploring integrations between college student services and municipal registries (Table 1, items 5, 6, 8, 9).

Conclusions. The consistent adaptation of the experience of Belgian colleges and universities of applied sciences offers an effective pathway for modernizing IT specialist training within Ukrainian professional pre-higher education institutions. This approach bridges the theoretical tilt of the educational process and significantly reinforces practical training across vocational institutions. The core emphasis of the formulated recommendations centers on the comprehensive transformation of educational and professional programs, internal quality governance

frameworks, and student-centered support through close collaboration with the IT industry and the integration of European standards.

Programmatic quality assurance is realized by benchmarking curricula against international and sectoral competence frameworks, notably "e-CF 2.0" and the "Agoria 12 ICT Roles." Introducing four-tiered descriptor models and institutionalizing employer advisory boards play a decisive role. Simultaneously, establishing a shared foundational first year for cognate IT specializations and flexible modular study modes accompanied by recognition of prior learning (RPL) procedures is proposed.

The practical dimension of training is delivered through public-private partnerships and the implementation of project-based learning driven by authentic briefs from IT enterprises. Key interventions include recruiting industry practitioners into the classroom, establishing applied research laboratories, deploying career guidance networks, and implementing tripartite mentorship during internships. The quality assurance system undergoes

a data-driven transformation powered by BI dashboards, learning analytics, e-portfolios, and digital quality factsheets. This is further reinforced by the automated faculty workload calculation model (UOTR), the PDCA quality cycle, and designated quality coordinator roles.

Student-centered support acts as a safeguard against academic attrition. It encompasses peer tutoring, student success services, leveling bridging courses, pedagogical coaching centers for industry practitioners, and the establishment of an architecturally and digitally barrier-free learning environment. Implementing the proposed recommendations will facilitate the transition of Ukraine's professional pre-higher education into an agile, industry-aligned system. This will ensure the harmonization of Ukrainian educational and professional programs with Belgian benchmarks, elevate instructional quality, optimize academic workload accounting, and broaden access to lifelong learning opportunities.

Conflict of Interest

The author certifies that no conflict of interest (financial, professional, or personal) exists that could have influenced the objectivity of the research results or conclusions. The integrity of the double-blind peer review process was ensured through a mandatory declaration of the absence of conflict of interest submitted via the journal's editorial system. This protocol guaranteed complete author anonymity and the independence of the expert evaluation throughout the entire editorial cycle.

Declaration on the Use of Generative Artificial Intelligence.

During the preparation of this manuscript, the authors used Google Gemini for searching and verifying bibliographic data, organizing materials, calculating derived indicators, preparing figures, and language editing and formatting of the text. The conceptual model, empirical data, scientific conclusions, and interpretation of the results are the authors' own. Following the use of the tool, the entire manuscript was reviewed and edited by the authors, who take full responsibility for its content and scientific accuracy. Artificial intelligence is not a co-author of this work.

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ІМПЛЕМЕНТАЦІЯ БЕЛЬГІЙСЬКОЇ МОДЕЛІ ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ПІДГОТОВКИ ФАХІВЦІВ З ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ У ФАХОВУ ПЕРЕДВИЩУ ОСВІТУ УКРАЇНИ

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Реферат

Актуальність статті визначається тривалою адаптацією випускників закладів фахової передвищої освіти (далі: ЗФПО) на першому робочому місці, що зумовлено: швидкими змінами в ІТ-галузі й повільним оновленням змісту підготовки студентів із прикладної інформатики; диспропорцією між теоретичною та практичною підготовкою майбутніх фахівців; недостатнім рівнем залучення бізнесу до розроблення, оновлення та модернізації освітніх програм. Розв'язанню цієї проблеми може сприяти аналіз та впровадження в українських ЗФПО дієвих європейських моделей професійної підготовки ІТ-фахівців, зокрема – бельгійської, яка успішно долає розрив між теорією та практикою завдяки прямій інтеграції в освітній процес галузевих рамок компетенцій (e-CF, Agoria).

Мета. Обґрунтувати практичні рекомендації щодо впровадження у ЗФПО України провідного досвіду діяльності бельгійських коледжів та університетів прикладних наук з підвищення якості підготовки ІТ-фахівців.

Методи. Дослідження ґрунтується на аналізі та системному узагальненні освітніх практик 27 бельгійських закладів ФПО та університетів прикладних наук (професійної вищої освіти). Застосовано методи порівняльно-педагогічного аналізу, текстового аналізу нормативно-методичних документів (e-CF 2.0, Agoria), кластеризації за основними напрямками з їх подальшим аналітичним структуруванням, а також зіставлення інструментів моніторингу якості (PDCA, CAF, PSAF, SOAR).

Результати. Визначено ключові напрями бельгійської моделі забезпечення якості освіти, на основі яких розроблено чотири блоки практичних рекомендацій для українських ЗФПО. Під час розроблення освітніх програм рекомендовано інтегрувати рамки «e-CF» та «12 ІКТ-ролей Agogia», а також впровадити кластери компетенцій, починаючи з першого року підготовки студентів, шляхом створення постійних консультативних груп роботодавців. Додатково обґрунтовано доцільність розширення вечірніх і модульних форм навчання з процедурами перевірки та визнання попереднього досвіду (RPL, VAE). Для забезпечення автентичного навчання запропоновано впроваджувати проєктне навчання на замовлення ІТ-компаній, залучати фахівців-практиків до створення практичних лабораторій та розгортати мережу центрів «Обсерваторія кар'єри». У системі управління якістю обґрунтовано застосування ВІ-панелей, навчальної аналітики, електронних портфоліо та цифрових карт якості, а також автоматизованого обліку навантаження викладачів (модель UOTR) із залученням координаторів з якості. Для підтримки та супроводу студентів рекомендовано нормативно закріпити студентське тьюторство, доповнивши його службами підтримки успішності, компенсаційними «містковими» курсами, центрами педагогічного коучингу для викладачів-практиків та єдиними сервісними центрами підтримки.

Висновки. Комплексна адаптація бельгійської прикладної моделі підвищення якості освіти сприятиме системній трансформації змісту підготовки студентів у вітчизняній системі ФПО. Такий підхід дозволить створити гнучкий механізм підготовки конкурентоспроможних ІТ-випускників, який повністю відповідатиме вимогам сучасного бізнесу. Впровадження запропонованих практичних рекомендацій (модернізація освітніх програм на основі e-CF та Agogia, розгортання проєктного навчання, цифровізація управління якістю) підвищить якість підготовки випускників ЗФПО відповідно до європейських стандартів.

Keywords: *прикладна інформатика; бельгійські коледжі; e-Portfolio; бізнес-інформаційна система; студентоцентризований супровід; освіта, ІТ-галузь.*

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