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INTEGRATING ENTREPRENEURIAL COMPONENTS INTO THE VOCATIONAL TRAINING OF EXPERTS: INTERNATIONAL AND UKRAINIAN EXPERIENCE

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Abstract. The article presents a comprehensive study of integrating entrepreneurial components into the system of vocational training of experts. The methodological framework of the investigation is based on a comparative analysis of international ecosystem models (dual, cooperative and phenomenological) and an examination of Ukraine's experience in transforming the educational environment. The study explores the nature of entrepreneurial competence as a cross-cutting meta-competence (*mindset*) that corresponds to the standards of the European *EntreComp* framework. The main outcome of the research is the justification of the authors' hybrid 'Win-Win' model which integrates European quality standards, American rapid prototyping techniques (*Lean Startup*) and national priorities for post-war recovery, particularly in the *Military-tech* sector. A three-stage algorithm for implementing entrepreneurial content has been suggested: from cross-cutting integration into professional training courses to encouraging extracurricular activities. The effectiveness of modern diagnostic tools (pitching, *self-assessment*) and the need to transform educational institutions into 'learning ecosystems' have been demonstrated. Prospects for further research imply the experimental testing of the suggested model in the context of vocational education digitalisation.

Key words: *EntreComp* framework, dual education system, social responsibility, educational ecosystem, competence-based approach, 'Win-Win' algorithm, *Lean Startup*, post-war recovery.

Introduction. In the context of global digitalisation, today's labour market requires professionals to possess not only fundamental knowledge but also well-developed entrepreneurial skills. At the national level, this requirement is laid down in the Law of Ukraine 'On Education', where 'entrepreneurship and financial literacy' are defined as one of the key competences for lifelong learning (Law of Ukraine 'On Education', 2017). The sector's future development strategy, as set out in the Strategy for the Development of Higher Education in Ukraine for 2022–2032, emphasises the need to train experts capable of engaging in innovative activities and adapting swiftly to the demands of digital economy (Cabinet of Ministers of Ukraine Order No. 286-r, 2022).

In the global academic literature, this issue is studied in terms of 'entrepreneurial mindset'. Leading international institutions, OECD and UNESCO in particular, define entrepreneurship as the universal ability to transform ideas into financial, cultural or social value (OECD, 2023a; UNESCO-UNEVOC, 2022). The *EntreComp* framework has become a key tool for standardising this process in the EU; it sets out 15 cross-cutting competences necessary to realise entrepreneurial potential (Bacigalupo et al., 2016).

In Ukraine, the conceptual foundations for transforming vocational education in the context of digitalisation and the challenges posed by martial law are the subject of systems academic research.

In particular, the issues of developing teachers' digital competence and creating an innovative educational environment have been thoroughly examined by V. Radkevych (2024a) and N. Nychkalo (2014). The issues of vocational training in terms of the competence-based approach and pedagogical expertise in the context of contemporary market transformations have been studied by N. Volkova and O. Lebid (2022). The mechanisms for integrating digital tools into the educational process of vocational and technical education are the focus of researchers at the Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine. A common trend of these studies is the justification of the need to transfer to an ecosystem learning model which ensures flexible learning pathways and enables graduates to adapt to digital economy demands (Radkevych, 2024a; Nychkalo, 2014; Volkova & Lebid, 2022).

The aim of the study is to provide a theoretical justification and develop an original hybrid model for integrating entrepreneurial components into vocational training of experts based on the synergy between international experience and the Ukrainian socio-economic context.

Materials and research methods. To achieve the objective, a range of research methods was used: a comparative analysis (to compare the models of the USA, the EU and Australia); a systems and structural approach (to develop a three-level integration model); and a content analysis of the regulatory framework (the Law of Ukraine 'On Education' and the EntreComp strategies). The study was based on a retrospective analysis of educational reforms in Ukraine (2022–2026) and analytical reports provided by international organisations.

Results and discussion. Entrepreneurial competence is regarded as an integrative personality trait encompassing a combination of knowledge, abilities, skills, and value- and motivation-based attitudes. This competence is essential for developing a competitive expert. As I. Seredina argues, in contemporary European educational practice, the preparation for entrepreneurship is impossible without the intensive use of digital technologies. They transform teaching methods and ensure the development of a proactive attitude among students in the context of global economic challenges (Seredina, 2025). The main components of this competence are: creativity, strategic planning, financial literacy and leadership qualities.

Planning and managing project activities require the ability to set objectives, develop effective strategies for achieving them, arrange resources efficiently, monitor task completion and analyse results (Anishchenko et al., 2019). An important component is financial literacy which includes the understanding of economic fundamentals of entrepreneurship, the ability to plan finances, create a budget, assess profitability and control costs (Vygovska, 2025). Equally important are communication skills and leadership qualities which ensure effective interpersonal interaction, the ability to negotiate, work in a team, motivate those involved in the process, and make responsible decisions (Tsaruk, 2026). The list is completed by the ability to assess risks and make management decisions which involves the capacity to analyse potential threats, predict consequences, develop alternatives and make optimal decisions under uncertainty (Oleksiuk, 2025).

International experience highlights a range of effective models for vocational training designed to develop students' entrepreneurial skills. In international practice, considerable attention is paid to institutionally and pedagogically sound approaches that ensure the effective integration of theoretical knowledge and practical skills.

The analysis of international models enables to identify the principles and techniques fostering the development of entrepreneurial thinking, preparing students for independent professional activity, and helping them realise their potential in today's labour market. At the heart of this integration lies a current understanding of the concept of 'entrepreneurship' not merely as the ability to start a business, but as a specific mindset that enables ideas to be transformed into value – financial, cultural or social. That is why the European Union recognises entrepreneurship as one of the eight key competences for lifelong learning. The main tool for its development and standardisation within the education system

is the EntreComp framework (The Entrepreneurship Competence Framework), which elaborates on this approach through a system of interrelated descriptors (Bacigalupo et al., 2016).

The implementation of the European framework for entrepreneurial competence, EntreComp, within the vocational education system of other countries (France and Estonia, in particular) is based on a cross-cutting approach. It involves the integration of three main domains: 'Ideas and Opportunities' focused on developing creativity, strategic vision and ethical thinking by identifying social challenges as a prospect for development; 'Resources' aimed at fostering self-awareness, financial literacy and the ability to mobilise intellectual and material assets; 'Transition to Action' defining willingness for initiative, strategic planning and constructive risk management (Bacigalupo et al., 2016). The practical implementation of this model transforms training of future teachers from the reproductive knowledge transfer into project-oriented activity. It means that students do not merely master teaching techniques but also develop an original project for a digital educational environment or a concept for an inclusive hub applying elements of EntreComp in order to create added social and cultural value in the education space.

An analysis of international experience enables to classify approaches to the development of entrepreneurial competencies according to several key models.

The Scandinavian model: social responsibility and sustainable development. Denmark, Sweden and Finland are currently leading the way in implementing entrepreneurship education in terms of the public good. Within this model, the focus shifts to social entrepreneurship where business is seen as a tool for addressing specific social issues: from inclusion and support for elderly people to greening initiatives. The key tool here is phenomenological learning (Finland) focused on addressing real societal challenges. Instead of studying traditional isolated subjects, learners work on 'phenomena' – comprehensive topics with practical applications. For example, as part of the 'Urban Ecology' module, future experts develop waste recycling business models for their local communities, integrating environmental, economic and social aspects (Finnish National Agency for Education, 2020). A striking example of the practical implementation of this approach is the Team Academy (Tiimiakatemia) methodology. It is based on team coaching and the creation of real companies from the very first year which allows students to develop entrepreneurial skills in their professional activity and within market interaction (OECD, 2023b).

The US model: the university as an innovation hub (Stanford, MIT). The American model focuses on the effective knowledge commercialisation, with the university acting as the centre of an ecosystem that integrates science, business and financial mechanisms for commercialising investments. The key mechanism of this model is the creation of spin-off companies – enterprises based on innovative scientific developments of teachers and students. The universities provide a full cycle of support: from patent legal support to the access to accelerator programmes, such as the Stanford Technology Ventures Program (STVP) specialising in training leaders for high-tech industries (Stanford University). An important mindset feature of the American ecosystem is a 'culture of risk-taking' and mistake tolerance. A start-up failure whilst studying is not viewed as a reputational disaster but rather as a valuable practical experience in managing under uncertainty, which significantly enhances a graduate's market value and their appeal to employers (Massachusetts Institute of Technology, 2023; WIPO, 2024).

The German dual model and intrapreneurship. Germany implements a strategy that combines fundamental academic training with an in-depth practical immersion in production processes. This model is based on the Dual Education (Duale Ausbildung) system, where study time is divided between an educational institution and a company on a 50/50 basis. This ensures not only high qualification but also early professional socialisation of students (BIBB, 2023; Horidko, 2024). A distinctive feature of the German approach is the emphasis on intrapreneurship (internal entrepreneurship). The aim is to train experts capable of initiating innovation, optimising costs and

taking responsibility for the results of their department acting as ‘entrepreneurs within the corporation’. This approach allows companies to maintain flexibility and innovation within the established structures (OECD, 2022). Furthermore, contemporary analytical data underlines that such synergy reduces the skills mismatch in the high-tech sectors of the digital economy (OECD, 2023b). The effectiveness of this model is significantly enhanced by the activities of the Steinbeis Foundation network which acts as a mediator in technology transfer processes between universities and representatives of small and medium-sized enterprises (Mittelstand). Involving students in the foundation’s consultancy and research projects enables them to master the tools of practical management and innovative logistics whilst still studying (Steinbeis-Stiftung, 2024).

The cooperative model and entrepreneurial universities (USA, Canada, the Baltic states). The cooperative education model is based on the systems integration of academic study with professional work placements, with particular attention being paid to ‘practice firms’ models. According to the UNESCO-UNEVOC interactive guide (2022), entrepreneurial education in technical and vocational education and training (TVET) institutions is viewed not as a separate course but as a systems transformation of the institution. A key element of this approach is the creation of an ‘institutional entrepreneurial ecosystem’ encompassing four strategic levels: institutional management, curriculum development, engagement with external partners, and the development of an entrepreneurial culture among students. The experience of the Baltic countries demonstrates the effectiveness of involving future experts in solving real business cases and creating incubators that focus on developing ‘entrepreneurial initiative’ as a cross-cutting competence for experts. Such firms are currently united in global networks enabling students to conduct virtual cross-border operations whilst mastering international trade skills (PEN Worldwide, 2024). In the Baltic states, particularly in Estonia, this concept has evolved into the ‘entrepreneurial university’ model, where an educational institution becomes the core of a start-up ecosystem. Universities host incubators and accelerator hubs (for example, *Mektory* at Tallinn University of Technology), which provide mentoring support for projects at the *pre-seed* stage. Research confirms that this approach not only contributes to the creation of new jobs but also fosters a high level of adaptability among students to the conditions of digital economy (European Commission, 2024).

Experiential learning (Australia). The approach to experiential learning in the Australian education system is based on the widespread implementation of *Work-Integrated Learning* (WIL). This model involves students participating in *pro bono* projects and establishing systems partnerships with businesses in the field of applied research. This stimulates technical creativity and willingness to develop high-tech solutions. According to TEQSA reports (2023), this approach helps bridge the gap between theoretical training and the real demands of Industry 4.0 transforming students from passive listeners into active researchers and practitioners. The new National Foundation Skills Strategy for 2025–2035 is of particular significance. It views digital literacy and problem-solving skills not merely as technical competencies but as a fundamental basis for economic participation and innovation. According to the reform concept, the development of ‘entrepreneurial thinking’ is integrated directly into *VET qualifications* enabling the training of engineering and teaching staff who can adapt the educational process to the requirements of Industry 5.0 (Department of Employment and Workplace Relations, 2024).

An analysis of global practices suggests that the development of entrepreneurial competence within the vocational education system has evolved from teaching the isolated business fundamentals to the creation of holistic innovation ecosystems. In the modern paradigm, entrepreneurship is viewed not merely as a set of economic knowledge, but as a cross-cutting meta-competence that requires a fundamental transformation of the teacher’s role. The teacher stops being merely a knowledge transmitter, they become coaches and mentors who possess entrepreneurial mindset and are capable of integrating principles of the EntreComp framework into any academic course.

The fundamental principle underlying all the models discussed is the priority given to '*learning by doing*'. A common feature of international practice is the use of real or simulated business environments which allow students to progress from idea to product in a safe setting. This is reflected in the creation of start-up hubs in the USA, a network of practice firms in the Baltic states, or team-based companies within the Finnish *Team Academy* methodology. This approach ensures not only professional expertise but also the psychological willingness to make decisions under uncertainty.

A key feature of successful models is their ecosystem-based approach and strategic partnerships. Effective professional training is currently impossible without the close integration of education, business and the community. Striking examples of such synergy include Germany's dual system, where an enterprise is a full-fledged learning entity, and Australian *pro bono* projects which combine applied research with addressing societal needs. This creates the conditions for a socio-digital development trajectory where entrepreneurial education focuses on social responsibility and digital adaptability, which is crucial in the context of the transition to Industry 5.0.

These established international benchmarks provide a solid conceptual foundation for analysing the Ukrainian experience. They identify the most viable tools for elaborating an adaptive model to develop entrepreneurial competence, one that would address the specific challenges of transforming vocational education in Ukraine and meet the requirements of post-war economic recovery.

The current state of human capital development in Ukraine is characterised by a systems transformation of vocational and higher education. It is defined by a shift from a rigid academic tradition towards flexible, competence-based learning. In the context of global digitalisation, the development of an entrepreneurial component is no longer merely an educational option but is becoming a strategic priority for national security and economic growth.

The current stage of education sector development (2022–2026) can be described as a period of digital adaptation and mobilised innovative development. Whilst previous stages focused on the theoretical justification of competencies, in accordance with the priorities of the Strategy for the Higher Education Development in Ukraine for 2022–2032, the current stage is characterised by a transition to practice-oriented digitalisation and the strengthening of the autonomy of educational institutions in the context of crisis management (Decree of the President of Ukraine No. 333/2021).

In scientific reports of the Institute of Vocational Education of the National Academy of Pedagogical Sciences of Ukraine (Radkevych, 2024a), this period is identified as a phase of 'crisis resilience and digital leap'. Its key characteristics are content pragmatism through the reorientation of educational programmes towards training experts capable of self-employment and establishing micro-enterprises in communities; the institutionalisation of start-up culture due to the legal establishment of incubators and centres of excellence; and large-scale digital integration involving the active use of 'Diia. Education' ecosystem resources as an effective tool for rapid development of entrepreneurial skills and ensuring professional mobility of students in the context of post-war recovery.

The legal basis for this transformation is the Law of Ukraine 'On Education' (Article 12) which identifies 'entrepreneurship and financial literacy' as one of the 11 key competences for lifelong learning at all levels. For higher education system, it is further reinforced by the relevant provisions of the Law of Ukraine "On Higher Education", where support for the academic start-up movement is defined as a strategic priority. Such integration of levels enables to create a continuous trajectory: from the development of a basic *entrepreneurial mindset* in vocational education institutions to the implementation of high-tech start-up projects (*spin-offs*) within university incubators. In the context of post-war recovery, this stage requires education to train 'expert-owner' capable not only of professionally performing technical operations but also of effectively managing resources and risks.

An analysis of Ukraine's current regulatory framework, in particular the Strategy for Innovation Sector Development until 2030 and Presidential Decree No. 333/2021, demonstrates a strong alignment between national educational objectives and the European EntreComp framework. The

country is consistently adapting leading international models, as evidenced by the introduction of dual education elements (CMU Resolution No. 1340) following the successful German model, the individualisation of education pathways based on the Finnish experience, and the systems reform of management mechanisms based on Polish practice (Kravchyna, 2017).

These transformations are being put into practice through the development of the academic start-up movement, where leading higher education institutions have already established a powerful infrastructure to support innovations. The examples of such successful implementation include ‘Sikorsky Challenge’ start-up school at the Igor Sikorsky Kyiv Polytechnic Institute (Sikorsky Challenge, 2024), business incubators at the Kyiv National Economic University, and Centre for Entrepreneurship at the Ukrainian Catholic University (Zygriy, O., & Shchetylova, 2020). These platforms provide students with the opportunity to go through a full project development cycle: from generating an idea to creating a minimum viable product (MVP).

Public-private partnership (PPP) projects are an important addition to this system. In particular, V. Radkevych (2024b) emphasises the crucial importance of establishing sectoral clusters and career development centres. Such institutions enable the integration of real business directly into the educational environment. It facilitates the transition from theoretical learning to practical training of experts able to solve specific problems in transport, agricultural or engineering sectors in the context of the country recovery.

Despite significant progress, there are substantial barriers hindering the development of entrepreneurial potential. They include academic inertia which implies the predominance of theoretical ‘teaching about entrepreneurship’ over practice-oriented ‘teaching for entrepreneurship’ as well as a lack of real business experience among teachers which creates a gap between academic knowledge and market realities. As A. Lavoshnyk (2024) states, it is a high-quality academic environment that provides access to mentoring and real case studies and is a decisive factor in developing students’ entrepreneurial ambitions. However, its development is often restricted by a lack of seed capital and modern prototyping laboratories (FabLabs). At the same time, a distinctive feature of the Ukrainian context is the growing significance of social entrepreneurship as a recovery driver. In the context of war and the need to reintegrate veterans and internally displaced persons (IDPs), it requires education to train experts capable of creating sustainable businesses to solve social problems. It includes the introduction of modules on business ethics and sustainable development which directly correlates with the Scandinavian model of social responsibility.

In order to arrange the material presented and clearly illustrate the gap between international standards and Ukrainian practice, it is advisable to conduct a comparative analysis of the main parameters of the educational process (Table 1). Such a comparison enables to identify critical points where the Ukrainian system has already made some progress (particularly in terms of regulatory framework) and areas requiring immediate reform, such as assessment methods and material and technical resources. It provides a clear understanding of the strategic directions for adapting foreign experience to the specific conditions of wartime and the post-war period.

Data generalization and retrospective analysis suggest that the development of an entrepreneurial component within the vocational education system is currently not merely a methodological task but a strategic focus of educational policy in the context of the economy’s innovative transformation. International experience clearly demonstrates the effectiveness of a comprehensive paradigm integrating a dual training system, the development of an entrepreneurial environment within educational institutions, the operation of model enterprises (training firms) and the development of soft skills through practical training. Despite the challenging conditions of martial law, Ukraine demonstrates positive momentum due to the growth of start-up movement and content digitisation. However, further success requires full integration of education into the national innovation ecosystem with the active participation of both public institutions and private sector (investors, business associations and industry clusters).

Table 1

**A Comparative Analysis of Implementing Entrepreneurship Education:
Global Trends and Ukrainian Context**

Aspect	Foreign experience	Ukrainian Context
Regulatory framework	Clear strategies (e.g. EntreComp, Europe 2020, national entrepreneurship programmes)	The Ukrainian laws ‘On Education’, ‘On Vocational Education’, and the New Ukrainian School standards, but the implementation is uneven
Entrepreneurial competence in the programmes	Integrated into all levels of education, including vocational education	Included partially as individual elective courses or short modules
Teaching methods	The use of practice-oriented methods: business simulations, case studies, start-up incubators and work-based learning	The theoretical approach predominates, although there are separate examples of project-based learning
Teacher training	Comprehensive professional development courses, compulsory participation in international training sessions	Limited opportunities for specialised teacher training specifically in entrepreneurship
Facilities	Modern laboratories, FabLabs and start-up centres based directly within educational institutions	Facilities have been partially updated via training and practical centres (TPCs), but are often out of date
Partnership with businesses	Close collaboration with companies, structured business mentoring, a well-established dual system	Partnerships have been established in some institutions, but overall, they are ad hoc in nature
Assessment of results	Comprehensive assessment: presenting business projects, pitching ideas, creating a professional portfolio	Assessment is mainly based on traditional knowledge testing; practical projects are rarely assessed
Students’ motivation	High due to the real opportunity to commercialise students’ own ideas whilst studying	Moderately low due to a lack of successful local examples and systems support

Compiled by the authors

The development of social entrepreneurship is emerging as a promising direction to modernise the content of vocational education in Ukraine. Unlike traditional commercial models, it focuses future experts on addressing socially significant issues – ranging from environmental safety and inclusion to overcoming socio-economic consequences of war – through the implementation of sustainable business mechanisms. The integration of a social component into students’ training, particularly for technical and transport sectors, fosters a synergy between professional expertise and a high sense of civic responsibility, which is a key driver of sustainable development and rapid restoration of communities’ social infrastructure.

To systematically incorporate an entrepreneurial component into the educational process, it is advisable to implement a comprehensive three-stage integration model. The *cross-cutting* level involves a widespread incorporation of entrepreneurial case studies into general education and vocational courses, in particular through tasks such as resource optimisation or cost calculation. The *specialised* level is aimed at introducing targeted modules (‘Fundamentals of Start-up Design’, ‘Personal Branding’). The *institutional* level stimulates extracurricular activity by establishing business clubs and organising hackathons. Such structure transforms an educational institution into a holistic ecosystem for developing professional and entrepreneurial competence of future experts.

Particular attention should be paid to diagnostic tools as being an integrative concept, entrepreneurial competence is difficult to measure using traditional tests. International experience

suggests a shift towards authentic assessment which involves the use of e-portfolios to document real achievements, the arrangement of idea pitchings as a format for public project presentation to experts and stakeholders, and the implementation of self-assessment procedures. Based on the descriptors of the European EntreComp framework, self-assessment allows learners to independently track their progress which stimulates reflection and comprehensively measures the development of personal and professional qualities (soft skills).

Drawing on global experience and taking current challenges into account, this framework can be implemented through the authors' 'Win-Win' algorithm. Its strategy is based on the synergy of three key elements. The fundamental component adapts the EntreComp framework to standardise assessment. The instrumental component integrates the Lean Startup methodology with its 'Build-Measure-Learn' cycle to foster flexible thinking through prototype testing rather than writing static business plans. The contextual component ensures the model localisation by taking national priorities into account (military-tech, reconstruction projects, social entrepreneurship). It enables the development of an 'entrepreneurial professional' – a proactive expert capable of transforming obstacles into development opportunities in digital economy.

The effectiveness of the suggested model should be assessed using a comprehensive set of criteria. They range from the development of competencies as defined by EntreComp and the ability to pitch start-up ideas independently to the extent to which the educational institution is integrated into business partner networks. Key indicators include active participation in workshops and incubation programmes as well as the subjective and objective willingness of students for self-employment and a high degree of professional adaptability in a changing market environment.

Table 2

The structure of the authors' 'Win-Win' model for developing entrepreneurial competencies

Model component	Content / Function	Result
The European Commission EntreComp framework	Developing an entrepreneurial mindset, initiative, creativity, financial literacy and risk management skills	Development of entrepreneurial competencies
Lean Startup (Build–Measure–Learn)	Generating and testing ideas through the 'create – test – refine' cycle	Ensuring practice-oriented learning
National priorities (Military-tech, recovery, social business)	Adapting the educational process to the needs of post-war recovery, social entrepreneurship and digital economy	Focus on the country's strategic challenges and needs
The authors' 'Win-Win' model	Integrating the EntreComp standards, the Lean Startup methodology and national priorities into a coherent education system	Training contemporary, competitive experts
An entrepreneurial professional	The development of soft skills, entrepreneurial thinking, the capacity for innovation and self-employment	High professional adaptability and willingness for Industry 5.0.

Source: developed by the authors based on a synthesis of the EntreComp framework, the Lean Startup methodology and Ukraine's national priorities for post-war recovery

The implementation of the authors' 'Win-Win' model involves a phased approach beginning with a *diagnostic phase* aimed at verifying the baseline level of students' entrepreneurial competencies and assessing the teaching staff's willingness for innovative transformations. It is followed by an *arrangement and design phase* which involves adapting educational programmes, establishing partnerships with businesses, and designing a personalised digital environment. A *practice-oriented phase* focuses on the direct implementation of start-up projects, addressing real business cases,

arranging hackathons and scaling up dual education. It logically culminates in a *reflective and evaluative phase* during which participants undertake self-assessment, publicly pitch the solutions they have developed, and conduct a comprehensive evaluation of the effectiveness of the suggested model.

It is anticipated that the systems implementation of the authors' 'Win-Win' model within the academic and scientific sphere will result in achieving a number of strategic outcomes. They include a significant increase in entrepreneurial activity and initiative among students; intensified development of self-employment, strategic planning and project management skills under high uncertainty; strengthened cooperation between educational institutions, representatives of real economy and local communities; comprehensive development of digital and financial literacy as a fundamental basis for personal resilience, as well as training of highly qualified experts capable of rapid professional adaptation according to the requirements of Industry 5.0 and the priority tasks of national post-war economic recovery.

The modernisation of educational space and the shift from traditional lecture-based formats require the design of 'learning ecosystems'. This implies not only architectural changes (the creation of co-working zones for cross-functional teamwork) but also a radical transformation of the teacher's role – from a content disseminator to a mentor, facilitator and educational engineer who guides students on the path from an idea to a viable project. An important component of this ecosystem is the integration of digital platforms to simulate market relations which ensure the development of entrepreneurial initiative and a high level of professional adaptability among future experts in a dynamic digital environment.

Conclusions. The study substantiates the transformation of entrepreneurial competence from a narrowly specialised skill into a cross-cutting meta-competence (mindset) which serves as the foundation for experts' professional self-fulfilment and their ability to turn ideas into economic, social and cultural value. In the current context of digital economy and Ukraine's post-war recovery, entrepreneurship is viewed not merely as a tool for conducting business but as a fundamental feature of a competitive and adaptable professional.

It has been demonstrated that the effective integration of entrepreneurial components into vocational training should be based on the 'learning-by-doing' principle. It is implemented through dual education, practice-oriented case studies, start-up projects, training firms and the simulation of real market processes. An analysis of international experience has confirmed that the most effective models are ecosystem-based ones where education, business, community and digital environment function as interconnected elements of a single innovation space.

It has been established that the European EntreComp framework serves as an effective tool for standardising and assessing entrepreneurial competences. The suggested three-stage integration model (cross-cutting, specialised and institutional levels) ensures the systems incorporation of entrepreneurial content into the educational process without overcrowding the curriculum and also creates conditions to develop entrepreneurial initiative among learners.

Particular attention has been paid to the changing role of a teacher, who, within the current educational paradigm, is no longer merely a knowledge transmitter but takes on the roles of a mentor, facilitator and educational engineer. It is this model of pedagogical interaction that fosters the development of adaptable professionals capable of working under uncertainty, digitalisation and rapid technological change.

By synthesising international practices and Ukrainian experience, an original hybrid 'Win-Win' model has been developed. It combines the European EntreComp standards, the American Lean Startup methodology, and the national priorities for Ukraine's post-war recovery. The suggested model aims at training an 'entrepreneurial professional' – an expert capable of combining professional expertise, innovation, social responsibility and willingness to create their own projects within the context of Industry 5.0.

A promising area for further research implies experimental testing of the 'Win-Win' model in vocational and higher education institutions as well as developing methodological tools for quantitative and qualitative assessment of entrepreneurial competence among future experts.

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