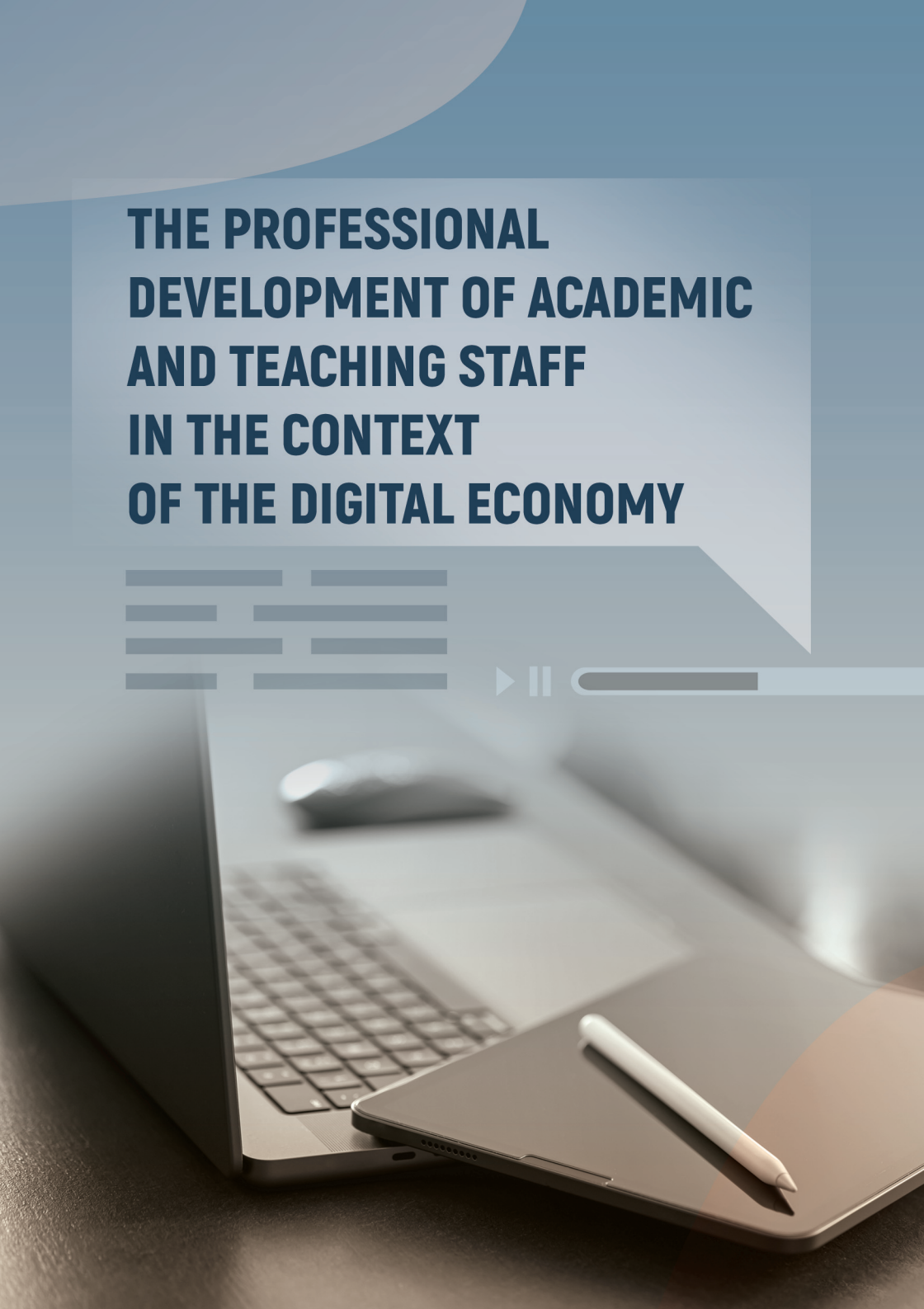
THE PROFESSIONAL DEVELOPMENT OF ACADEMIC AND TEACHING STAFF IN THE CONTEXT OF THE DIGITAL ECONOMY



MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
Admiral Makarov National University of Shipbuilding

THE PROFESSIONAL DEVELOPMENT OF ACADEMIC AND TEACHING STAFF IN THE CONTEXT OF THE DIGITAL ECONOMY

Guidelines

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These methodological guidelines address current issues relating to the transformation of the professional practice of higher education lecturers in the context of the digitalisation of the economy and society. It analyses the changing role of the modern lecturer – from a traditional source of knowledge to a facilitator, mentor and designer of digital learning environment. Particular attention is paid to the adaptation of the European framework for digital competences, DigCompEdu, for lecturers in economic disciplines, as well as the integration of innovative technologies, in particular artificial intelligence, learning management systems (LMS) and educational data analytics, into the teaching process. The publication contains practical approaches to implementing advanced teaching methods (PBL, Flipped Classroom, Microlearning) and recommendations for establishing continuing professional development (CPD) systems at university level.

Work is intended for higher education institution administrators, academic and teaching staff, specialists at teaching excellence centres, and anyone interested in the digital transformation of higher education.

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CONTENTS

LIST OF ABBREVIATIONS

HEI.....Higher Education Institution
DPD .....Digital Professional Development
ICT .....Information and Communication Technologies
AI.....Artificial Intelligence

INTRODUCTION

Relevance, objectives and tasks of the methodological guidelines. The current stage of societal development is characterised by rapid technological progress, the active introduction of innovations and the intensification of technological convergence processes. The convergence of information, bio-, nano- and cognitive technologies is shaping a new quality of the socio-economic environment, in which digital solutions are becoming a key factor in the competitiveness of states, organisations and specialists. In these conditions, the development of human capital capable of operating in the digital economy, global competition and rapid technological change takes on particular significance.

The digital economy is gradually transforming all areas of public life, turning digital technologies from a supporting tool into the foundation of production, management and social processes. Artificial intelligence, the Internet of Things, blockchain, cloud technologies and data analytics are creating new opportunities to boost productivity and foster innovation, but at the same time are changing the requirements for professional training and the higher education system.

In such circumstances, the higher education system plays a strategic role in developing competent and innovation-oriented human capital. It raises the issue of professional development for academic and teaching staff, which is gradually shifting from occasional professional development to a continuous process of updating professional and digital skills. A lecturer's professional development in a digital environment requires not only proficiency in information and communication technologies, but also the ability to effectively design the educational process, apply innovative pedagogical models, ensure academic integrity and cybersecurity, and foster in students the skills to use digital resources responsibly.

The digital transformation of education opens up new opportunities for expanding access to educational resources, increasing the flexibility of learning and personalising educational pathways. The use of online platforms, learning management systems, open educational resources, virtual laboratories and digital simulations contributes to the development of an interactive and innovative educational environment. At the same time, these processes are accompanied by a number of challenges, including digital inequality, the risk of reduced interpersonal interaction, issues of academic integrity, as well as questions of information security and the protection of personal data.

Within this context, the professional development of academic and teaching staff is a key factor in the successful integration of digital technologies into the higher education system, as it is the lecturer who acts as the primary agent for introducing innovations and ensuring the quality of the educational process.

This guide aims to provide academic and teaching staff, as well as the administration of higher education institutions, with a systematic set of tools for developing a modern professional development ecosystem within the digital economy. The guide aims to support the creation of a flexible and innovative system for the professional development of lecturers, enabling the effective preparation of specialists for a labour market where digital technologies, artificial intelligence, data analytics and the constant transformation of professional roles play a key role. The proposed approach involves combining individual teacher development with institutional mechanisms at the university and integration with national and European digital initiatives, taking into account the current challenges facing Ukraine.

Key objectives of these methodological guidelines are: one of the key objectives of this guide is to analyse the transformation of the teacher's professional role in the context of the digitalisation of education and rising expectations among learners. The modern teacher is increasingly acting not only as a source of knowledge, but also as a facilitator of the learning process, a mentor, a supervisor of individual educational pathways, and a designer of the

digital learning environment. These changes in the teacher's role are driven by the need to ensure flexible learning formats, interactivity, the use of artificial intelligence technologies, transparency in assessment, and a practical focus on preparing specialists for the digital labour market. The analysis is based on the results of international research and current Ukrainian educational practices.

A key objective of the guide is to adapt the DigCompEdu international framework for digital competences to the specificities of teaching economic disciplines, as well as to systematise approaches to integrating innovative technologies – learning management systems, artificial intelligence tools and cloud services – into the educational process.

The guideline contains examples of practical case studies and best educational practices, including the use of project-based and blended learning, as well as a summary of experience in implementing international educational initiatives. Particular attention is paid to formulating recommendations for establishing systems of continuous professional development for lecturers at the departmental and higher education institution levels.

The target audience for these guidelines is the administration of higher education institutions, heads of professional development centres, lecturers in economics-related disciplines, and specialists involved in the digital transformation of education.

The structure of the guidelines is based on a logical sequence: from an analysis of global trends in the development of digital education and self-assessment of teachers' professional competences, to the mastery of modern teaching methods and the formulation of strategies for long-term professional development.

Methodological framework of the guidelines. The methodological framework of the guidelines on the professional development of teaching staff at higher education institutions in Ukraine in the context of the digital economy is based on international strategic documents and concepts that define contemporary standards for teachers' digital competences and the directions of digital transformation in education. Key sources include recommendations from UNESCO, the Organisation for Economic Co-operation

and Development, and the Digital Education Action Plan initiative [1–3], which form the conceptual foundations for the development of digital education, the creation of an effective digital educational ecosystem, and the support of teachers' continuous professional development.

An important reference has the ICT Competency Framework for Teachers [4], which defines a systematic model of digital competencies for teachers. It provides for the development of a range of ICT competencies necessary for integrating digital technologies into the teaching process and fostering students' digital skills. The model structures competencies across several aspects of professional activity and levels of development, allowing it to be used as a basis for developing teacher professional development programmes.

Analytical materials from the Organisation for Economic Co-operation and Development, in particular the OECD Digital Education Outlook 2023 [5], emphasise that the effectiveness of the digitalisation of education is determined not only by the introduction of technologies, but above all by the level of teacher training and their ability to integrate digital tools into pedagogical practice. Internationale recommendations stress that there's a need to establish clear standards for digital competences, develop systems for continuous professional development, and create integrated digital educational ecosystems.

The strategic priorities for the modernisation of education are also set out in the Digital Education Action Plan, which provides the development of a highly effective digital education infrastructure and the enhancement of citizens' digital competences. In higher education institutions, these provisions are implemented through the use of European digital skills assessment tools, in particular DigCompEdu, DigComp and SELFIE for Teachers [6–8], which enable monitor teachers' digital skills and plan individual pathways for their professional development.

Applying these approaches supports the development of universities' digital educational infrastructure, the integration

of learning management systems, open educational resources and digital content, as well as the use of flexible professional development formats – short online courses, micro-modules and international educational programmes. Forming a culture of responsible use of digital technologies and artificial intelligence in the educational process is also of particular importance.

An important aspect of a teacher's professional development is the self-assessment of digital competences. The European SELFIE for Teachers tool enables teachers to assess their own level of digital competence in line with the DigCompEdu model and to chart a personalised path for their professional development.

Thus, the application of approaches and recommendations from UNESCO, the Organisation for Economic Co-operation and Development (OECD) and the Digital Education Action Plan provides a scientific and methodological foundation for the formation of a system of professional development for teaching staff at Ukrainian higher education institutions. Adapting these approaches will facilitate the integration of the national education system into the European Higher Education Area and enhance the readiness of teaching staff to work in the digital economy.

In the context of modern education, ensuring the inclusivity of the digital learning environment has particular importance. Digital platforms offer a wide range of tools that can facilitate access to learning content for different categories of students. In particular, automatic subtitles in video conferences, adaptive formats for learning materials, or the option to present assignments in various formats (text, audio or video) help to create a more accessible educational environment. The use of such tools is in line with modern approaches to ensuring equal opportunities in education.

Therefore, international strategic documents in the field of digital education provide a comprehensive methodological framework for the development of digital competences among higher education lecturers. Their practical application within Ukrainian universities will help to improve the quality of the educational process, expand opportunities for the use of digital technologies,

and facilitate the gradual integration of the Ukrainian higher education system into the European Higher Education Area. At the same time, the implementation of such recommendations enables lecturers to adapt more effectively to the conditions of the digital economy and ensure that students receive a modern standard of education.

To summarise, these methodological guidelines aim to establish a comprehensive scientific and methodological approach to the professional development of academic and teaching staff at higher education institutions in Ukraine, against the backdrop of the digital transformation of society and the economy. Drawing on contemporary international frameworks for digital competences and practices in the development of digital education, the guideline offers a systematic toolkit for improving teachers' pedagogical skills, integrating innovative technologies into the teaching process, and establishing an effective digital educational ecosystem within the university. The implementation of the proposed approaches will contribute to improving the quality of the educational process, developing the digital competences of lecturers and students, and strengthening the ability of higher education institutions to adapt to the challenges of the digital economy and integrate into the European educational area.

In the digital economy, demands are increasing on the level of digital literacy among teaching staff, their ability to integrate digital technologies into the teaching process, and to use modern teaching methods based on active interaction and independent work by students. Another important aspect is the development of information literacy skills, ensuring academic integrity, and fostering a culture of responsible use of digital resources.

Thus, the professional activities of university lecturers in the digital economy are characterised by the need to combine pedagogical, methodological and digital competences. It requires the systematic professional development of teaching staff, the updating of methodological approaches to teaching, and the active use of the opportunities offered by the digital educational environment.

Chapter I

MODERN CHALLENGES AND TRENDS IN THE PROFESSIONAL PRACTICE OF UNIVERSITY LECTURERS IN THE DIGITAL ECONOMY

The development of the digital economy is having a significant impact on the higher education system and transforming approaches to the organisation of the educational process in higher education institutions. The active introduction of digital technologies, the spread of online education, the use of cloud services, distance learning platforms and artificial intelligence tools are contributing to the formation of a new educational environment in which the nature of a lecturer's professional activities is changing.

Nowadays, lecturers at higher education institutions do not merely impart knowledge; they also organize the learning process within a digital educational environment, foster the development of students' critical thinking, and help them build digital literacy and independent learning skills. A significant proportion of educational information is freely available in open digital resources, academic databases, and educational online platforms, which is transforming the traditional model of interaction between lecturers and students.

In the context of the digital economy, greater demands are placed on the level of digital literacy of academic staff, their ability to integrate digital technologies into the educational process, and to apply modern teaching methods based on active interaction and independent work of students. An important aspect is also the development of information management skills, the maintenance

of academic integrity, and the formation of a culture of responsible use of digital resources.

Thus, the professional activities of university lecturers in the digital economy are characterised by the need to combine pedagogical, methodological, and digital competencies. This requires systematic professional development of academic staff, the updating of methodological approaches to teaching, and the active use of the opportunities provided by the digital educational environment.

1.1 The Transformation of the Teacher's Role: from a Source of Knowledge to a Facilitator of the Learning Process

One of the key trends in the development of modern higher education is the changing role of the lecturer in the learning process. The traditional model of education assumed that the lecturer was the primary source of knowledge, and learning took place mainly through the delivery of material in lectures. In this model, the student is largely a passive recipient of information.

Digital technology is fundamentally changing this model. Today, students have access to a wealth of educational resources: digital libraries, academic databases, open online courses and multimedia learning materials. As a result, the role of the teacher is gradually evolving – from a mere transmitter of information to an organiser and coordinator of the learning process.

A modern teacher acts as a facilitator of learning, creating an environment in which students are actively engaged in the educational process, analyse information independently, discuss challenging issues and apply the knowledge they have gained in practice. Such a model places particular emphasis on the development of analytical thinking, communication skills and the ability to learn independently.

The fundamental challenge facing the modern academic community lies in a radical shift in the role of the lecturer within

the educational landscape. In the digital economy, where information has become abundant, easily accessible and dynamic, the traditional model of the teacher as the 'sole source of truth' and a transmitter of knowledge is finally losing its relevance [6]. The teacher is transforming into a multifunctional agent in the educational process, whose activities are based on the principles of 'partnership pedagogy' and aimed at coordinating, moderating and supporting the student in their individual educational journey.

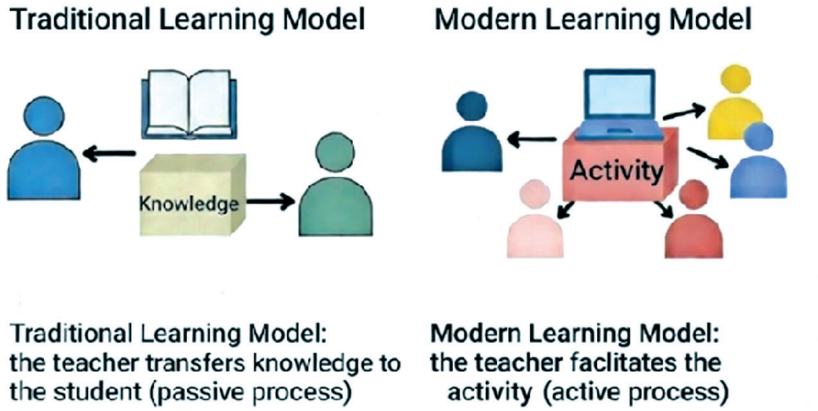

Figure 1 – The evolution of the teacher's role
in the digital learning environment

The transition to the role of facilitator means that the teacher's primary aim becomes to encourage, stimulate and guide the process of independent information-seeking and collaborative work among learners. Facilitation (to facilitate – to make easier, to assist) involves creating a psychological and organisational climate in which the student feels trust, empathy and openness, enabling them to maximise their potential (see Fig. 2) [9–10].

Unlike a traditional lecturer, a facilitator does not impose their own views but remains neutral regarding the content of the discussions, focusing instead on fostering positive group dynamics and stimulating the audience's thinking.

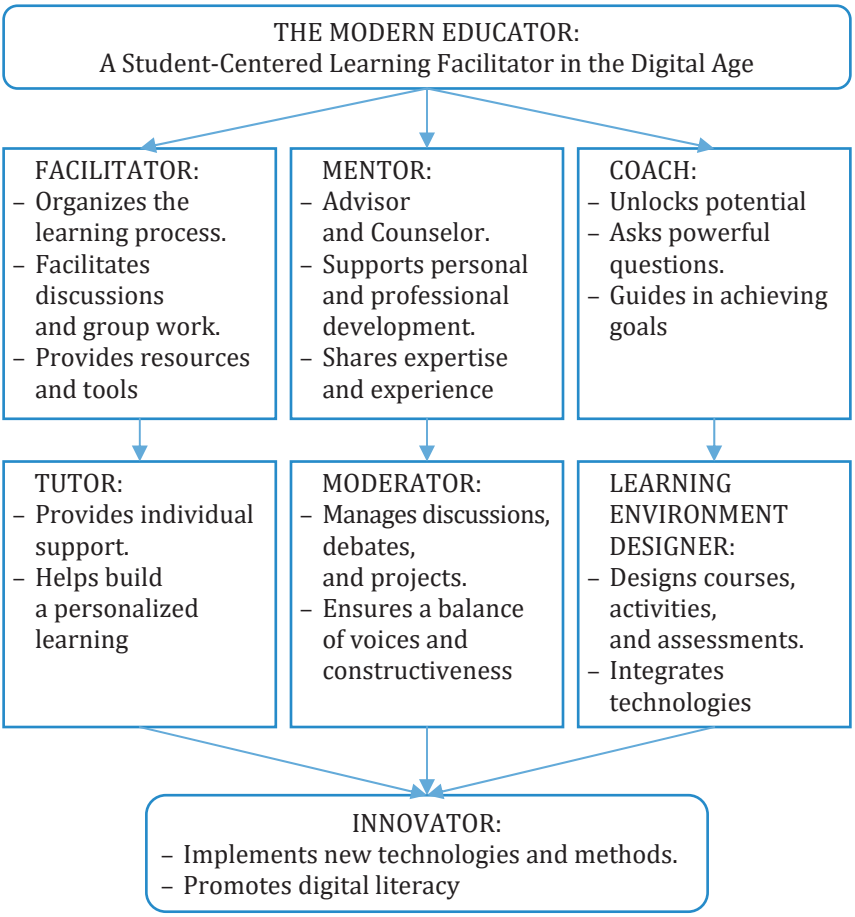

Figure 2 – A model of the contemporary roles of a university lecturer [7]

This change in role has deep roots in constructivist learning theory, where the student is viewed as an active agent who constructs their own knowledge, rather than a passive recipient of information. In a digital context, facilitation is complemented by the need to manage learning strategies across various platforms – from virtual classrooms to hands-on makerspaces. The teacher-

facilitator acts as a mediator between group discussions and complex digital content, helping students to develop critical thinking and self-regulation skills.

- A facilitator creates the conditions for independent and group learning; rather than teaching 'directly', he facilitates the process.
- A mentor is a long-term guide who supports professional and personal growth. A coach uses questions and reflection to help students find solutions themselves and realise their potential.
- A coach uses questions and reflection to help students find solutions themselves and realise their potential.
- Tutor – an individual guide who helps build a personalised learning pathway.
- Moderator – manages group processes (discussions, projects, debates), ensuring constructiveness and equality [11].
- Learning environment designer – course architect: designs activities, tasks, assessment and the integration of digital tools.
- Innovator – implements technologies (AI, VR, LMS, collaborative platforms) and constantly updates approaches.

The model in Fig. 3 illustrates a teacher's digital competence as an integrated system comprising three main functional blocks:

- Digital resources and tools – the ability to find, evaluate, adapt, create and manage digital learning content;
- Educational technologies – the integration of digital tools into the teaching process, and the organisation of active, personalised and inclusive learning;
- Digital communication – effective interaction with participants in the educational process (students, colleagues, parents, and the administration) via digital channels.

These three pillars are linked by a common horizontal component: Assessment and Analytics – the use of digital data and tools to monitor progress, provide feedback and make informed pedagogical decisions.

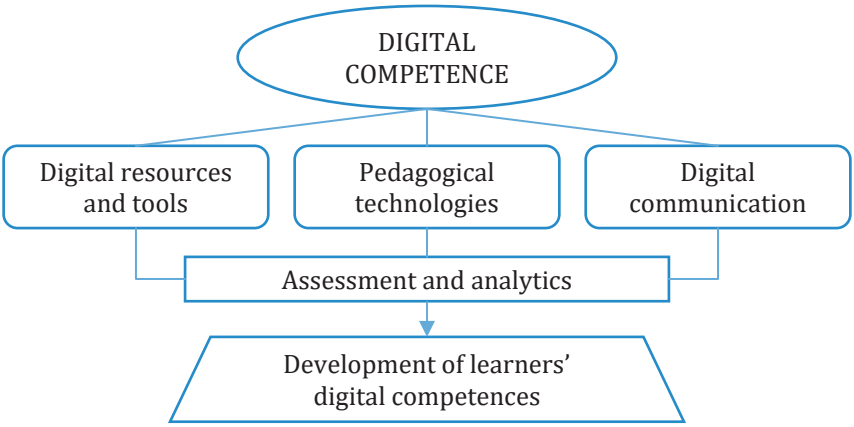

Figure 3 – Model of a teacher's digital competences [12]

The ultimate goal of the entire framework is to develop the digital competences of learners – equipping students with the ability to use digital technologies confidently, critically, creatively and responsibly in their learning and daily lives.

The model is conceptually aligned with the European DigCompEdu framework [7], but emphasises three key 'pillars' of pedagogical activity and their synthesis through analytics and assessment, which is particularly relevant in the context of the rapid digital transformation of higher education.

The transformation of the teacher's role can be structured by comparing key functional aspects of their work, as shown in Table 1 below.

This table demonstrates that the transformation is not merely a change in terminology, but a profound structural shift that requires teachers to be able to design a learning environment in which technology is not an afterthought, but an integral part of teaching methodology.

Table 1 – **Comparison of traditional and transformed teaching roles**

Activity aspect	The traditional model (Source of knowledge)	The modern model (Facilitator / Innovator)
Main paradigm	Teacher-centred: a focus on conveying content	Student-centred: a focus on the learning process and experience
Nature of the interaction	Vertical hierarchy; one-way 'one-to-many' communication	Horizontal partnership; 'many-to-many' networking
Content work	Broadcasting of static textbooks and recorded lectures	Curate dynamic digital content and create personalised journeys
Technological tools	Teaching aids (presentations, whiteboards)	Integrated platforms, adaptive systems, AI assistants
Feedback	Postponed (until after the exams or marking of assignments)	Instant, automated, and focused on progress (formative assessment)

1.2 Digital Challenges: Distance Learning, Educational Data Analytics and Artificial Intelligence in Teaching

The digital transformation of society and the economy is creating new demands on the higher education system and the professional practice of university lecturers. One of the key aspects of these changes is the active integration of digital technologies into the teaching process, which helps to improve access to education, expand opportunities for interaction between participants in the educational process, and utilise innovative teaching methods. At the same time, these processes create a number of new challenges for lecturers, linked to the need to adapt to new forms of organising educational activities, mastering digital tools, and ensuring the effectiveness of teaching in a digital environment [13].

The spread of distance and blended learning has become one the most noticeable manifestations of the digitalisation of education. The use of Learning Management Systems (LMS), video conferencing platforms, digital educational resources and interactive services makes it possible to organise the learning process regardless of the physical location of teachers and students. This format of learning ensures flexibility in the educational process, promotes personalised learning and broadens access to educational resources. At the same time, remote learning requires teachers to adopt new pedagogical approaches, in particular the ability to effectively organise online communication, maintain students' motivation to learn and monitor learning outcomes within a digital environment. For teachers, this means the need to master skills in working with digital data, interpreting it and using it to make pedagogical decisions; this presents certain challenges for teachers (see Fig. 4).

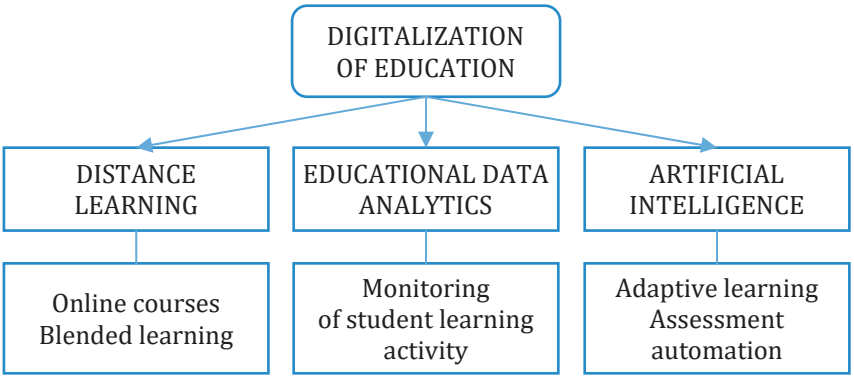

Figure 4 – Key digital challenges for university lecturers

Another key digital challenge for the higher education system is the integration of artificial intelligence technologies into the learning process. Modern AI-based systems can be used to create adaptive learning environments, automatically assess learning tasks, generate recommendations for students' individual educational pathways, and prepare teaching materials. Furthermore,

artificial intelligence tools can assist lecturers in preparing teaching content, analysing learning outcomes, and optimising the organisation of the educational process.

At the same time, the use of artificial intelligence technologies in education requires consideration of ethical aspects, in particular issues of academic integrity, copyright, algorithmic transparency and the responsible use of digital tools. In this regard, an important task for teachers is to help students develop the skills to use artificial intelligence technologies critically and to understand their capabilities and limitations [14].

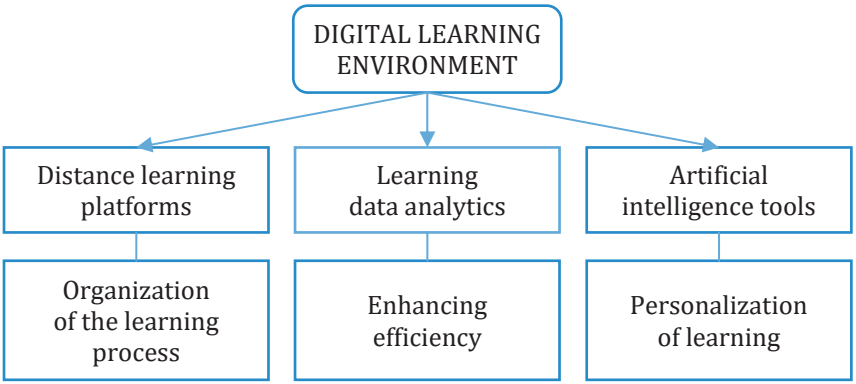

Figure 5 – The use of digital technologies
in the modern educational process

Thus, distance learning, educational data analytics and the use of artificial intelligence technologies are shaping a new paradigm for the organisation of the educational process in higher education institutions. For university lecturers, this means a need for continuous professional development, mastering modern digital tools and adapting teaching methods to the conditions of the digital educational environment. The effective use of these technologies contributes to improving the quality of education, developing students' individual learning pathways and building the competencies required for professional activity in the digital economy.

1.3 Educational and Ethical Aspects of the Use of Artificial Intelligence Technologies in Higher Education

The active introduction of artificial intelligence technologies into various spheres of public life, particularly in the field of education, opens up new opportunities for improving the effectiveness of the learning process. In higher education institutions, artificial intelligence tools can be used to prepare teaching materials, analyse students' learning activities, automate the assessment of learning outcomes, create adaptive learning environments, and support individual learning pathways for students.

At the same time, the integration of artificial intelligence technologies into the educational process requires consideration of a number of pedagogical and ethical aspects. First and foremost, this involves ensuring academic integrity, transparency in the use of digital tools, a responsible approach to information, and the development of students' critical thinking skills regarding the use of technology.

In an educational context, artificial intelligence is viewed as a tool to support the learning process, rather than as a replacement for the teacher. The teacher remains a key figure in shaping the educational environment, organising students' learning activities and developing their critical thinking. The teacher's task is to integrate the capabilities of artificial intelligence into the learning process in such a way that these technologies contribute to improving the quality of education, developing students' creative potential and building their professional competencies.

Particular attention must be paid to issues of academic integrity in the context of using generative artificial intelligence systems. Students may use such tools to draft texts, solve problems or create learning materials. In this regard, an important task for the lecturer is to foster in students an understanding of the ethical standards governing the use of digital technologies, the necessity of citing sources of information, and adherence to copyright principles (see Fig. 6) [15].

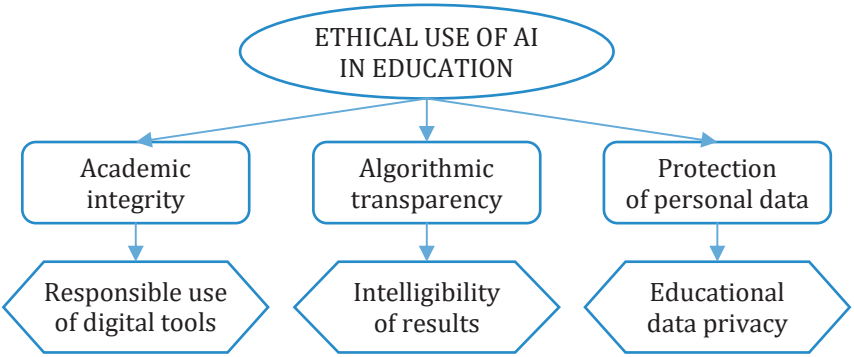

Figure 6 – Ethical principles for the use of artificial intelligence in the educational process

Another important aspect is ensuring transparency and accountability in the use of artificial intelligence algorithms. Decisions made on the basis of automated systems must be understandable and well-founded, and their application must not lead to discrimination or bias against specific groups of students. In this context, it is important to adhere to the principles of the ethical use of digital technologies, which include the protection of personal data, confidentiality of information and the responsible management of educational data.

The use of artificial intelligence technologies also requires the development of digital and information literacy skills among both teachers and students. It includes the ability to assess the reliability of information, critically analyse the results produced by algorithms, and understand the potential limitations and risks of using such technologies in the learning process.

Thus, the effective implementation of artificial intelligence technologies in higher education must be based on a combination of pedagogical innovations and ethical principles. These technologies can only become a vital tool for improving the quality of education and developing a modern digital learning environment if they are used responsibly.

Ethical considerations focus on fairness, privacy and the societal impact of AI. They require a balance between innovation and the protection of rights (see Fig. 7).

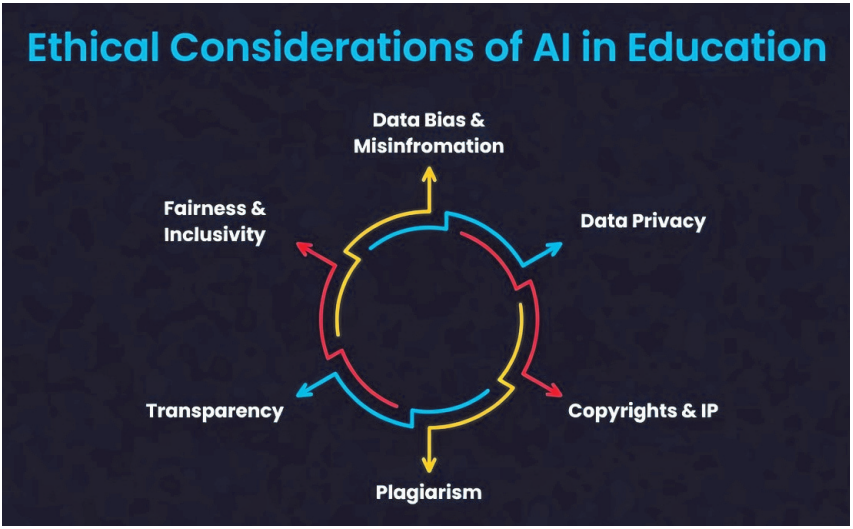

Figure 7 – Ethical aspects of artificial intelligence in education

Opportunities:

- Improving equity: AI can promote inclusivity, for example through tools designed for students with diverse needs, reducing barriers and fostering equal access to education.
- Ethical implementation: Developing AI policies, training programmes and audits helps minimise bias and ensure transparency, transforming risks into opportunities for ethical education.
- Supporting well-being: AI provides mental health support via chatbots, reducing stress and isolation, particularly for remote students.
- Policy innovation: The integration of AI drives the creation of ethical frameworks, such as ethics committees and AI literacy programmes, which prepare students for the future.

Risks:

- Data privacy: The collection of large amounts of students' personal data creates risks of data breaches, misuse or surveillance, in breach of regulations such as the GDPR or FERPA.
- Social isolation: A reduction in face-to-face interaction leads to loneliness, tech-related stress and a decline in emotional intelligence.
- Academic dishonesty: The ease with which AI can be used for plagiarism undermines the integrity of education.

1.4 Digital Challenges: Distance Learning, Educational Data Analytics, and Artificial Intelligence in Education

In the context of the widespread adoption of digital technologies across all areas of public life, including the higher education system, higher education institutions are faced with the need to adapt the educational process to new technological capabilities and changes in the ways in which knowledge is acquired and utilised. A key manifestation of this transformation is the emergence of new digital challenges for university lecturers, relating to distance learning, the use of educational data analytics and the integration of artificial intelligence technologies into the teaching process.

One of the most notable trends in the digitalisation of education has been the rise of distance and blended learning. The use of digital educational platforms, learning management systems (LMS), video conferencing services and interactive tools makes it possible to organise the educational process regardless of where learners are located. This helps to improve access to education, ensures flexibility in the learning process and allows for the use of a variety of learning materials, including video lectures, interactive tasks, e-courses and online tests.

Distance learning, which has become the dominant format as a result of global crises, has brought with it a number of specific challenges relating to mental health and cognitive load. Digital environments foster social isolation, technical difficulties and increased demands for self-regulation on the part of both teachers and students. The lack of direct face-to-face interaction erodes motivation and creates a sense of alienation.

One of the most serious consequences is digital burnout, which is described as a state of emotional and physical exhaustion caused by excessive interaction with digital tools. This phenomenon has a multidimensional structure, encompassing digital ageing (a sense of being unable to keep pace with change), digital deprivation and emotional exhaustion. Statistics from 2024–2025 indicate that over 57% of those involved in the educational process experience symptoms of digital burnout, whilst 58,9% acknowledge that excessive use of digital tools has a negative impact on their lives.

Table 2 – **Statistics on digital exhaustion**

Digital burnout subscale	Description of symptoms	Average figure (according to Erten & Ozdemir)
Digital burnout	Screen fatigue, reduced cognitive performance	34,42 ± 11,09
Digital deprivation	Stress caused by a lack of internet access, and the fear of missing out on information	19,12 ± 6,16
Emotional exhaustion	A loss of empathy, cynicism towards digital interaction	A high proportion of 57,5% of respondents

The problem of burnout is closely linked to workload management. According to research from 2025, teachers report symptoms of depression and stress at levels three times higher than the national average. The main source of stress is not teaching itself, but

the growing burden of small but frequent administrative tasks, excessive data collection and compliance requirements. Generative artificial intelligence has become the most disruptive and, at the same time, transformative factor in the professional lives of teachers between 2024 and 2026. Surveys conducted in 2025 show that students use AI primarily to save time (51%) and improve the quality of their work (50%), with 67% considering proficiency in AI tools to be a critically important skill in today's world [9].

Teachers are facing the 'Seventh Wave of AI in Assessment', where initial stress and attempts at detection are giving way to the development of new types of tasks that incorporate reflection on the use of AI [10]. The concept of 'Human in the Loop' (HITL) is emerging, emphasising the need for human oversight of AI-generated feedback and content to avoid bias and errors. This is particularly important in matters of inclusion and ethics, where AI may fail to take into account cultural nuances or the needs of people with disabilities [11].

The pedagogical significance of AI lies in shifting the focus from demonstrating competence (performance goals) to deepening knowledge (mastery goals). Higher-quality learning is observed when students use AI to construct and supplement their knowledge, rather than simply as a means of obtaining a ready-made answer [12]. The institutional response of universities in 2025 increasingly involves 'stress-testing' assessments to ensure that tasks cannot be completed by AI without critical reflection [9].

The market for blended learning courses is experiencing rapid growth, driven by the need for flexibility and accessibility. The integration of online and offline methods caters to a variety of learning styles, thereby increasing engagement and knowledge retention [13].

Research confirms that blended learning has a positive impact on learning outcomes (SMD = 0,611), particularly in non-STEM disciplines and when the online component accounts for an optimal proportion of 30–69% [12–14].

Table 3 – **Major categories of AL tools in higher education and their impact on lecturers' workload [13]**

AI tools category	Platform examples (2025)	Impact on a teacher's workload
Assessment and grading	Gradescope, EssayGrader, Writable	Reduction in the time taken to mark work by up to 80%
Planning and content	MagicSchool.ai, Eduaide.AI, Curipod	Creating plans and tasks in line with standards in a matter of minutes
Adaptive learning	Knewton Alta, Century Tech, Squirrel AI	Automatic identification and filling of knowledge gaps
Administrative support	Otter.ai, Capacity, Max (Maryville University)	Automation of responses to frequently asked questions (FAQs)

The development of immersive technologies (VR/AR) and gamification is a key area, as these enable students to practise their skills in a safe virtual environment. This is particularly relevant for medical and engineering education. At the same time, the role of microcredentials and digital badges is growing as alternative ways of validating competences that are suited to the dynamic labour market [15].

Competency-based learning in the digital economy requires from lecturers not only to possess technical expertise, but also to develop 'soft skills' such as empathy, communication and emotional intelligence. In 2025,soft skills will become equally critical to technical expertise, as they enable graduates to function effectively in environments characterised by innovation and teamwork. Higher education must foster the 'digital identity' and 'digital resilience' of both teachers and students [16-18].

The digital transformation of higher education in Ukraine is not merely a matter of modernisation, but also of survival and resilience in the context of the war. The national strategy up to 2030 identifies digitalisation as a priority, in line with the European action plan. Key achievements have included the expansion of

digital infrastructure, the development of the All-Ukrainian Online School, and the launch of innovative applications such as 'Mriia'.

International support plays a key role, particularly through projects run by UNESCO and Google.org, which provide teachers not only with technology but also with training in digital pedagogy. An important step is the launch of 'ChatGPT Edu' for Ukrainian educators and students, which allows the use of OpenAI's advanced models whilst adhering to security and privacy standards [19].

An example of successful institutional adaptation is Ivano-Frankivsk National Medical University (IFNMU), which implemented a pilot programme to train teachers in AI literacy in 2024–2025.

The programme covered almost 30% of academic and teaching staff and culminated in the adoption of Ukraine's first comprehensive 'Policy on the Use of Artificial Intelligence Systems'. An analysis of the challenges facing academic staff in 2025 enables the formulation of strategic recommendations for universities. Teacher burnout is a systemic problem that requires comprehensive solutions [13].

The transformation of university lecturers' professional practice in the digital economy is an irreversible process that requires a profound adaptation to new challenges. Digitization does not merely add new tools, but changes the very essence of teaching: from the transmission of information to the management of complex learning experiences. The introduction of AI and precision analytics opens up unprecedented opportunities for personalization, yet at the same time carries risks of dehumanization and burnout. The future of a successful university depends on the ability to balance technological power with a 'human touch', where the lecturer remains an indispensable architect of knowledge, an ethical guide and a mentor who inspires students to thrive in an ever-changing world. Ukraine, having demonstrated resilience in times of crisis, has the potential to become a leader in building such an integrated digital ecosystem that combines innovation with high standards of academic quality and human values [19].

Chapter II

COMPETENCY PROFILE OF THE MODERN UNIVERSITY LECTURER

Scientific research emphasises that an effective lecturer in the digital economy combines in-depth subject expertise, pedagogical skills and the ability to integrate digital technologies into the educational process. In this context, an important reference point is the European Digital Competence Framework for Educators (DigCompEdu), which defines the key areas for the development of a lecturer's professional practice in a digital environment. Whereas the primary task used to be the transfer of knowledge, but today the teacher increasingly acts as a facilitator of the learning process, a designer of educational experiences and a mentor who helps students navigate the complex digital information environment [7].

2.1 The Concept of The 'Digital Competence Framework for Educators' – Adaptation for Economics Disciplines

The Digital Competence Framework for Educators (DigCompEdu) is a conceptual model that describes the specific digital competences required by teachers to use technology effectively in the teaching process. The framework comprises **six key areas of competence and 22 specific competences**, covering the professional activities of teachers from the organisation of teaching to the development of students' digital literacy [1–3]. Its main idea lies not merely in the use of technology, but in the pedagogically sound integration of digital tools into teaching.

Important to note, that DigCompEdu views digital competence not as a separate technical skill, but as a comprehensive pedagogical ability that encompasses an understanding of the educational potential of technology, the critical evaluation of digital resources, and the ability to create an effective learning environment. This approach is in line with current trends in higher education, where digital tools are becoming a means of improving the quality of learning and personalising the educational process.

Key areas of digital competence for teachers. Within the DigCompEdu framework, digital competence for lecturers encompasses several key areas. The first of these relates to professional interaction, which involves the use of digital technologies for communication, collaboration and professional development. For lecturers in economics, this may include participation in international academic communities, the use of professional networks and the exchange of educational resources.

Another key area is working with digital resources, which involves searching for, creating and adapting teaching materials. In today's educational environment, lecturers must not only use ready-made materials but also be able to create their own digital resources: interactive presentations, video lectures, online tests or simulations of economic processes. Such materials can significantly increase student engagement in the learning process.

The third area concerns the organisation and management of learning in a digital environment. Lecturers must be able to use learning management systems (LMS), organise online classes, and integrate digital tools into the course structure. Research shows that the effective use of LMS improves interaction between lecturers and students and facilitates more systematic monitoring of the learning process [20].

The assessment of learning outcomes using digital technologies occupies a special place within the DigCompEdu framework. The use of digital tools allows for the automation of some assessment procedures, as well as the application of new approaches to

assessment, such as learning analytics. Such tools help teachers obtain more objective information about students' performance and their engagement in the learning process [21].

One more important area is supporting and empowering students, which involves using digital technologies to personalise learning. It's especially important when there are large numbers of students with varying levels of preparation. Digital tools make it possible to create adaptive tasks, provide personalised feedback and support students throughout their learning journey.

The final area concerns the development of students' digital literacy. Lecturers must not only use technology in their teaching, but also teach students to use digital resources responsibly, evaluate information critically and adhere to the principles of academic integrity.

Features of adapting DigCompEdu for economics. Although the DigCompEdu framework is universal in nature, its application in the teaching of economics has certain specific characteristics. Economics is a field in which data analysis, modelling and forecasting play a significant role; therefore, a teacher's digital competences must include the ability to work with economic data and analytical tools.

In practical terms, this means that lecturers can integrate open statistical databases, financial analytics platforms or software tools for economic modelling into the teaching process. For example, while studying macroeconomics, students can analyse data from international organisations, and during a finance course, they can work with real financial indicators from companies [22].

The use of such tools enables students to develop not only theoretical knowledge but also practical analytical skills, which are essential for the modern labour market. Research shows that the integration of digital technologies into economics teaching promotes a better understanding of complex economic processes and increases students' motivation to learn [5].

Table 4 – **Implementation of the DigCompEdu domains in the teaching of economics**

Field DigCompEdu	Competency content	Practical application in the teaching of economics	Examples of digital tools
1. Professional Engagement	The use of digital technologies for professional communication, collaboration and professional development	Lecturers maintain academic communication with students via the LMS, organise online consultations and participate in professional communities of economists	Moodle, Microsoft Teams, Zoom, LinkedIn, ResearchGate
2. Digital Resources	Creation, adaptation and use of digital educational materials	Development of interactive presentations on economic topics, creation of video lectures, and use of open-access economic databases	Canva, PowerPoint, YouTube, Statista, World Bank Data
3. Teaching and Learning	Integration of digital technologies into the learning process	Using case methods, simulations of economic processes, group online projects	Miro, Mentimeter, Kahoot, Google Workspace
4. Assessment	The use of digital tools to assess learning outcomes	Online tests, automated assessment of assignments, analysis of student performance	Moodle Quiz, Google Forms, Gradescope
5. Empowering Learners	Personalised learning and encouraging active student participation	Adaptive economics exercises, personalised learning pathways, the use of gamification	Coursera, EdX, Curipod
6. Facilitating Learners' Digital Competence	Formation of students' digital skills	Teaching how to work with economic data, using analytical platforms, and developing critical thinking	Excel, Power BI, Tableau, Python

One more important aspect is the use of economic simulations and game models, which allow students to experiment with different economic scenarios. For example, during lessons, it is possible to model a company's operations, consumer behaviour, or the impact of government policy on economic processes. This approach helps to develop strategic thinking and entrepreneurial skills [23–25].

Practical recommendations for lecturers in economics: For effective integration of the DigCompEdu framework into the teaching process, lecturers in economics would be well advised to follow a number of practical approaches.

Firstly, it is advisable to gradually introduce digital tools into the course structure, starting with simple elements such as online tests or interactive quizzes.

Secondly, it is advisable to use open economic data actively to complete practical tasks. Working with real data helps students better understand economic processes and develop analytical thinking skills.

Third, it is important to combine digital technologies with active learning methods such as discussions, case analyses, and project work. This approach helps prevent the formal use of technology without a real pedagogical effect.

The DigCompEdu framework is an effective tool for developing digital competencies in university professors. Adapting it to teaching economic disciplines allows us to combine traditional economic education with modern digital technologies and prepare students for work in the digital economy.

2.2 Key Competencies of a Digital Economy Instructor

The development of digital competence in economics teachers is a complex process that combines pedagogical, technological, and analytical aspects. Systematic implementation of digital tools in the educational process improves the quality of economic education and helps students develop the necessary skills to work in a digital economy.

Five competencies representing key modern requirements for higher education lecturer in the context of digitalization, hybrid/ online learning, and rapid societal and labor market changes have been identified. These competencies complement traditional pedagogical knowledge and subject-specific expertise, or 'hard skills,' and are often referred to as part of a teacher's professional digital competence (see Fig. 8).

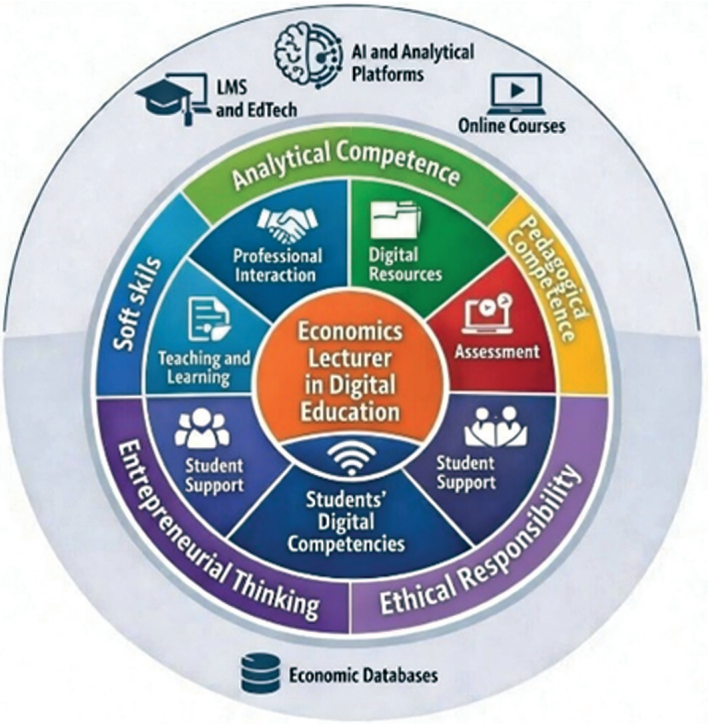

Figure 8 – Key Competencies of a Digital Economy Instructor

Pedagogical Digital Competence (mastery of EdTech, LMS, and interactive formats) is the ability of a teacher to effectively use digital tools and platforms to organize learning – not just 'being able to turn on Zoom.' In particular, it includes the ability to:

- confidently work with LMS platforms such as Moodle, Google Classroom, Canvas, and Blackboard;
- create interactive learning activities using tools like Mentimeter, Kahoot, Padlet, Genially, Canva Education, and Miro;
- conduct hybrid classes (simultaneously in-person and online);
- use adaptive learning platforms (e.g., Smart Sparrow, Coursera for Campus, etc.);
- integrate AI tools (such as ChatGPT, Gemini, Curipod) into teaching without compromising learning quality.

This forms the foundation for effective online and blended learning.

Analytical Competence (ability to work with educational data and student KPIs) is the ability to collect, analyze, and interpret data about student learning in order to make informed pedagogical decisions. Examples include:

- analyzing LMS reports (how much time a student spent on a module, number of test attempts, where they dropped out);
- tracking group progress using Learning Analytics (in Moodle, Google Analytics for Education, Power BI for Education);
- identifying dropout risks (early warning systems);
- evaluating the effectiveness of one's own teaching methods (comparing outcomes across groups using different approaches);
- providing personalized recommendations to students based on data.

In essence, this represents a shift from 'intuitive' teaching to evidence-based teaching.

Soft Skills (communication, critical thinking, collaboration in an online environment) are 'soft' skills that are particularly difficult to maintain in digital settings where non-verbal cues are limited. Examples in an online context include:

- facilitating meaningful discussions in chats, forums, or Zoom without chaos;
- quickly 'reading' students' emotional states through video or text (digital empathy);

- organizing teamwork in tools such as Miro, Jamboard, Google Docs, Discord, or Teams to ensure active participation;
- providing constructive written feedback without causing offense;
- developing students' critical thinking through online case studies, debates, and peer review.

In distance learning, these skills often weaken, which is why they must be consciously developed.

Entrepreneurial Thinking (an entrepreneurial approach to teaching economics) is not about teachers starting businesses, but about applying an entrepreneurial mindset to teaching (especially in economics). Examples include:

- seeing opportunities where others see problems (e.g., turning wartime constraints into creative online formats);
- creating value for students (not just delivering lectures, but providing tools that help them earn income or build careers);
- experimenting with new teaching methods and quickly evaluating their effectiveness;
- fostering entrepreneurial thinking in students through project-based learning, business simulations, and Lean Startup approaches in coursework;
- monetizing expertise (MOOCs, consulting, media contributions).

In teaching economics, this often means: teaching not just theory, but how to apply it in real-world value creation.

Ethical and Digital Responsibility (academic integrity, cybersecurity) involves a responsible approach to the digital environment, both by teachers and in shaping students' behavior. Examples include:

- combating plagiarism and AI-generated content misuse (using tools like Turnitin, GPTZero, but more importantly designing tasks where AI cannot replace human input);
- teaching proper citation practices and ethical use of data and AI;

- protecting students' personal data (e.g., not sharing grade screenshots in public chats);
- raising awareness of risks such as cyberbullying, phishing, and deepfakes in education;
- adhering to principles of inclusivity and accessibility (subtitles, alt text, screen reader compatibility).

This is no longer optional but a core part of professional ethics in 2026.

These five competencies together form the profile of a modern educator who can effectively operate in the digital age, personalize learning, use data to improve quality, and preserve the human dimension of education – even in online environments.

2.3 The 'T-shaped Educator' Model in the Professional Activity of a University Lecturer

In the modern educational environment, the concept of the 'T-shaped professional' is gaining popularity. Initially formulated in the field of innovation management and interdisciplinary collaboration, this concept describes a professional who is both broad-based and specialized. This model was later adapted to educational activities and became known as the 'T-shaped educator,' describing the competency profile of a modern university professor [1].

The essence of this model lies in combining in-depth professional expertise in one field of knowledge with a wide range of interdisciplinary and digital competencies. The model is graphically represented in the form of the letter T, where the vertical and horizontal parts symbolize the different components of a teacher's professional competence.

The vertical component of the model reflects the depth of the instructor's subject expertise. For an economics professor, this means having in-depth knowledge of economic theory, analysis methods, modern models, and market practices. It also requires

the ability to conduct scientific research, analyze economic processes, and integrate research results into the educational process. This depth of professional knowledge forms the academic authority of a teacher and ensures a high level of student preparation.

The horizontal bar symbolizes the wide range of interdisciplinary competencies that allow a teacher to work effectively in a digital and innovative educational environment. These competencies include:

- Digital pedagogical competence;
- Ability to use educational technologies (EdTech);
- Ability to work with educational and economic data;
- Communication and teamwork skills;
- Ability to collaborate across disciplines;
- Critical and systemic thinking.

For an economics lecturer, the horizontal dimension of the model means that alongside a deep knowledge of economics, they must be familiar with related fields such as digital technologies, data analysis, financial technologies (FinTech), innovation management, and entrepreneurship. This approach allows for the integration of modern economic practices into the learning process and the development of relevant professional competencies in students.

An important characteristic of the T-shaped educator model is the teacher's ability to mediate between different fields of knowledge. In economics education, for instance, this might entail combining economic theory with big data analysis, employing digital simulations of economic processes, or applying business analytics tools to student projects.

The practical implementation of this model assumes that economics lecturer does not limit himself to traditional teaching methods. Instead, he actively integrates digital platforms, analytical tools, and modern teaching methods – such as project-based learning, business case analysis, and research tasks – into the learning process.

Thus, the T-shaped educator model reflects a modern approach to developing the professional competence of university faculty. It combines in-depth subject expertise with broad digital, pedagogical, and interdisciplinary skills, enabling the educator to effectively work in a digital educational environment and ensure the training of professionals for the knowledge economy.

This section of the methodological guidelines considers the competence profile of a modern university teacher in the context of digital transformation in education.

This section of the methodological guidelines considers the competence profile of a modern university teacher in the context of the digital transformation of education. It demonstrates that the effective professional activity of a teacher today is based on a combination of in-depth professional expertise, pedagogical skills, and advanced digital competencies. It is also demonstrated that the modern teacher must have a variety of professional competencies, including digital pedagogy, analysis, communication, entrepreneurship and ethical responsibility in a digital environment. In this context, the T-shaped educator model provides an effective conceptual basis for professional development. It combines in-depth subject specialisation with a wide range of interdisciplinary and digital skills necessary for training specialists in the context of a digital economy.

Chapter III

METHODS OF INTEGRATING DIGITAL TECHNOLOGIES INTO ECONOMIC EDUCATION

The modern economy requires a radical rethink of approaches to preparing specialists who can act as an intellectual 'bridge' between technological innovations and business results. Digital transformation in higher education in economics and management is no longer a matter of choice, as the implementation of the Education 4.0 concept involves more than just equipping classrooms with gadgets; it requires the creation of a comprehensive ecosystem where digital tools are integrated into the very fabric of the pedagogical process, ensuring inclusivity, sustainability, and high adaptability to the challenges of the labour market.

3.1 Principles of Digital Integration: Effectiveness, Inclusivity, Sustainability, Openness

Effective integration of technologies into the educational process should be based on clearly defined principles that prevent the fragmentation of knowledge and create a solid foundation for sustainable development.

The principle of appropriateness and reliability. In digital education, appropriateness means choosing technological solutions that directly correlate with learning objectives and ethical standards. This involves creating 'reliable technologies for everyone', which includes enhanced protection of private data, transparent algorithms and tools that eliminate any discrimination. In the context of economic education, appropriateness requires the use of tools that prepare students for the realities of the digital job

market, for example through the implementation of enterprise resource planning (ERP) systems or cloud computing, which are critical for modern business.

The principle of inclusivity and social equality. Digital inclusion is aimed at overcoming the 'digital divide' (digital divide) and ensuring equal access to knowledge for all social groups, including people with disabilities and those in conflict zones or affected by natural disasters. The implementation of virtual learning platforms (VPLP) and the creation of specialised laboratories, such as ViDEL, enables students with disabilities to receive an inclusive education, while the digitisation of courses provides 'freedom of movement', allowing modules to be completed remotely in the event of unforeseen circumstances, such as military action. Here, inclusive education is not only considered in terms of technical accessibility, but also as a reform that supports diversity and eliminates alienation based on race, language, religion or physical abilities.

The principle of stability and continuous development. In education, sustainability involves striking a balance between economic efficiency and social justice. Digitalisation acts as an element of sustainable development, ensuring the adaptability of human capital to constantly changing conditions. Since more than a third of the skills required for work must be updated regularly, education must foster lifelong learning competencies. (lifelong learning). This also applies to the sustainability of the educational system itself, which must be able to function even in the event of the destruction of physical infrastructure, which can be achieved using cloud technologies and decentralised learning resources.

The principle of openness and global interaction. Openness involves creating a globally connected educational space where knowledge and data circulate freely. This includes using open educational and scientific information systems, participating in international consortia, and jointly developing curricula that meet the requirements of the Bologna Process.

3.2 Practical Approaches and Technological Learning Ecosystem

Modern economics lecturers should be able to use a wide range of digital tools, each of which plays a specific role in developing professional competencies. Practical integration covers infrastructure, analytics, interaction and simulation levels.

Learning Management Systems (LMS): Moodle, Google Classroom and Canvas.

The LMS is the digital foundation of the educational process, providing structure to knowledge and managing interaction between participants.

Moodle is an open platform widely used in the DigEco project for publishing lecture notes, independent study guidance and test suites. It enables the implementation of a blended learning model in which theoretical material is absorbed online, with classroom time used for discussion and solving case studies.

Google Classroom: It is distinguished by its simple deployment and seamless integration with Google Workspace tools (Docs, Sheets, Drive), making it ideal for quickly organising teamwork on projects.

Canvas: It offers a modern interface and powerful integration capabilities for external LTI tools, enabling the creation of complex learning paths with analytical elements.

Generative artificial intelligence (AI), in the form of models such as ChatGPT, Grok, Gemini and similar, is becoming an integral part of modern education, particularly at university level. Its use is justified by the need to adapt to the digital transformation of society, where AI is already being integrated into professional spheres, including economics, business and research. According to research, by 2026, 95% of students and teachers will use AI on campuses, with 81% of respondents considering its impact on education to be positive. The justification lies in enhancing the efficiency of learning, personalisation and preparation for the future labour market,

but with an emphasis on ethical and responsible application by both educators and students.

Teachers can use generative AI as a powerful assistant to free up time from routine tasks, allowing them to focus on quality interactions with students. For instance, AI can assist in generating evaluation criteria, sample comments, and preliminary assessments, thereby reducing the workload and facilitating dialogue about students' progress. AI can also be used to automate lesson planning, create personalised content and analyse learning data (learning analytics), enabling teachers to adapt materials to students' individual needs, such as different learning styles or speeds. Furthermore, AI can foster creativity in pedagogy. Teachers can use it to design interactive case studies, simulate business scenarios, or visualise complex economic models, thereby transforming traditional lectures into dynamic lessons. Surveys have shown that professional development with AI can be beneficial. It boosts teachers' confidence: in 2025, 50% had completed training, which is almost double the number from the previous year, and this leads to practical applications for task differentiation and feedback. Thus, AI does not replace the teacher, but rather strengthens their role as a facilitator, making education more effective and inclusive.

For students, generative AI is a valuable tool for enhancing independent learning and developing the skills required in the digital economy. Justified as a form of personalised tutoring, it enables students to explain complex concepts in simple terms, generate ideas for research and receive instant feedback, thereby improving their understanding and motivation. By 2026, 83% of students who are positive about AI will report that it increases their productivity and provides them with better support and real-time feedback, thereby preparing them for careers where AI is the norm. The justification also includes developing critical thinking skills: students learn to evaluate AI-generated content for accuracy, bias and relevance, thereby improving their digital literacy. In economics courses, for example, AI can simulate business

scenarios or analyse data, enabling students to 'experience' decision-making in a safe environment and promoting deeper learning. Research shows that, with the right guidance from teachers (e.g. through discussions about AI ethics), students use the tool 'instrumentally' – to deepen their understanding rather than avoid effort – thereby transforming potential risks into opportunities for growth. This is particularly relevant for students with special educational needs and disabilities, as AI can provide inclusivity through adaptive formats.

Although the advantages of using AI are significant, this must be balanced against risks such as plagiarism, misinformation and dependence on technology. Studies emphasise the need for an ethical approach: teachers should educate students to recognise AI-generated content and use verification tools such as GPTZero. They should also encourage students to integrate AI into tasks where it complements human thinking, rather than replacing it. Policymakers, including UNESCO, advocate a human-centred approach in which AI serves the principles of equality, security and human autonomy while avoiding bias and ensuring accessibility. By 2026, institutions will implement AI literacy training to minimise risks and maximise benefits, transforming AI into a tool for deeper learning.

The use of generative artificial intelligence is particularly important in teaching economic disciplines. Modern economics is largely based on the analysis of big data, digital platforms and automated systems for supporting decision-making. Therefore, integrating artificial intelligence tools into the learning process allows students to familiarise themselves with the technologies that are actively used in the modern business environment. Using such tools in education helps students to develop practical skills in working with analytical systems, improve their digital literacy and prepare them for professional activities in a digital economy.

The rapid adoption of generative artificial intelligence in professional activities and education is giving rise to a new set of

digital skills that are essential for effective human-machine interaction. One such key skill is prompt engineering: the process of formulating, structuring and optimising prompts for AI systems in order to obtain accurate, relevant and useful results.

Prompt engineering is becoming an important component of digital competence for both teachers and students, since the effectiveness of using generative models depends largely on the quality of the prompts formulated. In this context, users are active participants in the process of interacting with intelligent systems, determining the structure of requests, the context of tasks, the format of responses, and the criteria for evaluating results.

For a university lecturer, mastering prompt engineering skills opens up new possibilities for preparing and organising the teaching process. For example, by formulating prompts correctly, a lecturer can generate options for case studies, examples of economic situations, test questions of various levels of difficulty, practical scenarios or explanations of complex economic models. As a result, generative AI tools can become a digital assistant for teachers, optimising their pedagogical activities and improving the quality of educational content.

For students, the ability to formulate queries is an important skill for critical work with information and digital systems. During their studies, students should learn to formulate queries in such a way as to obtain analytical explanations, alternative approaches to solving economic problems, interpretation of statistical data or structured overviews of economic concepts. This practice fosters analytical thinking, the ability to formulate correct research questions, and the capacity to evaluate the quality of the responses received.

In the modern digital environment, prompt engineering is gradually evolving into a vital skill and a distinct professional field. In the field of information technology, business analytics and digital marketing, a new professional role is emerging: the prompt engineer, who specialises in creating effective prompts for artificial

intelligence systems, optimising the interaction between humans and algorithms, and adapting the results of model work to specific professional tasks [27].

In the context of higher education, this trend means that the ability to interact with generative artificial intelligence should be integrated into the structure of modern educational programmes. For economics lecturers, this could entail setting practical tasks to help students learn to formulate effective requests to AI systems, analyse the results and use them in the process of researching economic problems.

Thus, query engineering becomes a new component of digital competencies in the context of artificial intelligence development. Its integration into the learning process helps students to develop skills in working with intelligent systems, critical thinking and preparing for professional activities in the context of digital economy. For university lecturers, mastering prompt engineering methods is a valuable tool for enhancing teaching effectiveness, creating innovative educational content, and adapting the learning process to new technological realities.

In the modern educational environment, the effective use of generative artificial intelligence largely depends on the user's ability to formulate requests to intelligent systems correctly. This is why prompt engineering is considered a new digital competence for teachers and students. A structured prompt allows you to obtain more accurate, logical and pedagogically relevant results, which is particularly important in educational activities.

In general, the structure of an effective prompt in an educational context includes several key components.

1. *Context of the learning situation.* The first element of the request is to define the context of the learning task. This includes the topic, subject and level of student preparedness, as well as the educational objective. This enables the artificial intelligence system to correctly interpret the task and adapt its response to the academic environment. In teaching

economic disciplines, for example, the context may include the course topic (e.g. macroeconomics, finance or marketing), the level of study (e.g. bachelor's or master's) and the purpose of the task.

2. *The role of artificial intelligence.* When making a request, it is advisable to specify the task that the AI system should perform. This could be as a teacher, economic analyst, business planning consultant, or researcher, for example. Defining the role enables a more structured and professional response.
3. *The learning task or instruction* (i.e. the task). The central element of the request is the specific task that the system is required to perform. In the learning process, this could be an explanation of an economic theory, an analysis of statistical data, the creation of a learning case study, the preparation of test questions, or the structuring of a lecture. The clarity of the instruction significantly affects the quality of the response received.
4. *Conditions and restrictions.* This component determines additional parameters for task execution: text volume, level of difficulty, academic style, use of examples or orientation towards a specific audience. In teaching economic disciplines, such constraints may include the use of real economic indicators, case studies or the comparison of economic models.
5. *Output format:* the format in which the result is presented. The final element of the request structure determines the form in which the response should be presented. This may be a textual explanation, a table, a list of theses, an algorithm for solving a task or a presentation structure. This is particularly important in the educational process, as different response formats can be used for various pedagogical purposes [28–31].

In the context of economic education, structured queries allow the use of generative artificial intelligence as a tool for analysing economic processes, modelling market situations, preparing cases and practical tasks. This allows students to develop skills in eco-

nomic analysis, critical thinking and working with information systems.

Therefore, understanding the structure of prompts in prompt engineering systems is an important part of modern teachers' and students' digital competence. Formulating queries correctly enables you to utilise the capabilities of generative artificial intelligence effectively to support the learning process, improve the quality of educational materials, and develop analytical and professional skills in economics.

An example of the successful implementation of digital competencies at the Admiral Makarov National University of Shipbuilding is the 'Digitalisation of Economics as an Element of the Sustainable Development of Ukraine and Tajikistan' project, which is part of the Erasmus+ KA2 – Capacity Building in Higher Education (CBHE) – Joint Projects programme. The project's reference number is 618270-EPP-1-2020-1-LT-EPPKA2-CBHE-JP – DigEco.

The project ran from November 2020 to December 2023, focusing on modernising higher education in Ukraine and Tajikistan by implementing elements of the digital economy. It was initiated to overcome the challenges of the global market related to digitalisation and to ensure the sustainable development of these countries' economies based on the principles of Education 4.0.

The project was coordinated by Mykolas Romeris University (Lithuania). The European partners were: University of Applied Sciences Hamburg (Germany) and University of Maribor (Slovenia). The following Ukrainian universities were involved: Pryazovskyi State Technical University (PSTU, leader in the economic field), Dmytro Motornyi Tavria State Agrotechnological University (TSATU), Kamianets-Podilskyi Ivan Ohiienko National University (K-PNU), Zhytomyr Polytechnic State University (ZTU) and Admiral Makarov National University of Shipbuilding (NUOS). From Tajikistan: various universities (not specified in the sources). In total, the project brought together 16 partners, including universities, business organisations, government representatives and

international enterprises/SMEs, to develop programmes together. Stakeholders from business (e.g. Big Four, IT companies) were also involved to ensure labour market relevance.

The project's broad objective is to implement digital economy practices in higher education in Ukraine and Tajikistan based on international education 4.0 practices to strengthen economic development.

The project's specific tasks included:

- *Modernising the curriculum:* Implementation of multidisciplinary master's courses in digital economics such as 'FinTech', 'Business Analytics', 'Big Data', 'Blockchain', combining theory with practice in economics, IT, and programming to prepare students for the digital job market.
- *Creation of opportunities for inclusive education:* Development of the Virtual Project Learning Platform (VPLP) with the Project Inclusive Education (PIE) component, as well as ViDEL Labs (Virtual Digital Economy Labs), equipped to support people with disabilities and ensure equal access to education.
- *Stakeholder engagement:* Collaboration with businesses, governments, and international partners to build networks, develop retraining courses, and strengthen links between universities and the labour market.
- *Staff training:* Training by European academics (e.g. February – March 2021), improving English proficiency, internationalisation, and implementing new methodologies (PBL – project-based learning, blended learning).
- *Adapting to challenges:* Ensuring continuity of learning during crises (war, disasters) through digitalisation and virtual mobility.

The project addresses labour market gaps by preparing specialists capable of integrating digital technologies into business processes, products, and models, aligning with the EU Digital Single Market strategy and the Bologna Process.

The project's activities included:

- *Platform development:* Creation of a VPLP with PIE for virtual, project-based learning, enabling interdisciplinary student teamwork under the supervision of European lecturers.
- *Training and masterclasses:* Interactive sessions for economics faculty lecturers with EU partners on innovative teaching *methods.*
- *Programme modernisation:* Integration of interdisciplinary subjects at the intersection of digital technologies and economics, with a focus on practical application through hackathons and business projects.
- *Inclusive activities:* Accessible lab equipment for people with disabilities and courses adapted to regional needs. Further implementation details will be provided in the next section of the methodological guidelines.

Thus, integrating digital technologies into economic education is essential for modernising the educational process and preparing competitive professionals for the digital economy. Applying the principles of relevance, inclusivity, sustainability, and openness supports the systematic digital transformation of university education and the development of a modern educational ecosystem. The use of learning management systems, analytical digital tools, generative AI, and project-based learning enhances learning effectiveness, develops analytical thinking, and strengthens practical competencies. A key element of this transformation is the development of new digital skills, particularly query engineering, to ensure effective human–machine interaction.

Chapter IV

ADVANCED TEACHING PRACTICES AND PROFESSIONAL DEVELOPMENT

The provisions set out in previous sections of the methodological recommendations, particularly with regard to the evolving role of teachers in the digital economy and the development of their professional and digital competencies, form the conceptual basis for summarising best teaching practices and professional development. In the context of lifelong learning, teacher professional development is considered an ongoing process combining innovative pedagogical models, peer learning and reflection, participation in professional communities and the active use of digital and open educational resources. This section presents best practices relevant to a wide range of educators, based on a synthesis of international experience, particularly the findings obtained within the DigEco project. Higher education institutions can adapt these practices to support the sustainable professional development of educators in a digital educational environment.

4.1 Learning Models that Support Professional Development

Given the ongoing nature of professional development for teachers in a digital educational environment, training models that combine innovative teaching methods with the simultaneous development of professional and digital competencies among educators are particularly important. Unlike traditional approaches, these models focus on active learning, reflection on one's own pedagogical practice, collaboration and using digital tools as an integral part of the educational process. In this context, it is useful

to consider effective training models from international educational practice that can be used to support the professional development of teachers in formal, non-formal and informal settings.

Problem-Based Learning (PBL)

Problem-Based Learning is a pedagogical model based on learning through solving complex, real-life problems. In the context of professional development for teachers, PBL promotes critical thinking, teamwork, reflection and pedagogical facilitation. Teachers involved in PBL as participants or designers of the learning process transition from transmitting knowledge to modelling learning situations, which aligns with the demands of digital and competency-based education. Research confirms the positive impact of PBL on the development of critical thinking and the ability to learn independently, which are key components of lifelong learning.

Problem-Based Learning (PBL) is a particularly relevant model for teaching economics and management, as it directly reflects the logic of professional activity: analysing complex situations, making decisions in uncertain conditions and teamwork. In the context of professional development for teachers, PBL should be considered not only as a method of teaching students, but also as a tool for developing the pedagogical and digital competencies of teachers in accordance with the DigCompEdu framework [28].

For economics and management lecturers, PBL implementation ensures:

- development of digital pedagogical competence through the integration of digital resources and active learning methods;
- transition from content-oriented teaching to a competence-based approach;
- increased ability to facilitate, mentor and engage in reflective pedagogical practice;
- aligning teaching with the requirements of DigCompEdu, particularly with regard to active learning and assessment.

For students, PBL promotes:

- forming critical and systemic thinking;
- developing teamwork, communication and decision-making skills;
- applying economic and management knowledge in a digital environment;
- increasing readiness for professional activity in the context of the digital economy [32; 33].

Table 6 – **Sequence of PBL implementation in the learning process**

Stages	Activity content
1. Problem design	The lecturer develops a complex, interdisciplinary problem related to real economic or management challenges (e.g. digital transformation of a business model, analysis of a company's financial stability, risk management in unstable market conditions). The problem should be open-ended, with no single correct solution, and involve the use of data, digital tools and analytics
2. Organising the learning process and roles	Students form small groups within which roles are defined (analyst, moderator, speaker, etc.). The teacher acts as a facilitator, supporting the process of asking questions, searching for information and reflection, rather than directly imparting knowledge
3. Researching the problem and working with digital tools	During the problem-solving process, students work with open data, digital platforms and analytical tools such as tables, dashboards and simulations. This approach meets the current requirements of economic education. The lecturer moderates this process, focusing on the quality of the reasoning and justification of decisions
4. Presentation of results and reflection	Groups present their proposed solutions, justify their chosen strategies and evaluate the alternatives. A key element of this stage is joint reflection on the learning process, the tools used, and the results obtained. For teachers, this stage provides the basis for analysing their own teaching practice

Thus, Problem-Based Learning is not only an effective didactic model, but also a tool for the professional development of teachers, in line with the principles of lifelong learning and modern European approaches to developing digital competencies among educators.

Flipped Classroom (Flipped Learning)

The Flipped Classroom model (Flipped Learning) involves moving the acquisition of theoretical material into the digital out-of-classroom space, with the subsequent use of classroom time for active learning, discussion and practical tasks. For the professional development of teachers, this approach is a tool for rethinking the structure of lessons, increasing pedagogical effectiveness and developing digital didactic skills. Research suggests that flipped learning increases engagement, fosters autonomy among learners and creates conditions for deeper processing of complex topics during face-to-face or synchronous interaction.

The Flipped Classroom model is an effective tool for modernising the teaching of economics and management in the context of the digital economy, as it allows for an optimal combination of digital resources and active classroom work. For teachers, this model is not only a didactic approach, but also a mechanism for developing professional digital competencies, as defined by the DigCompEdu framework, particularly in the areas of designing the learning process, active learning and digital assessment [28].

Expected results of implementing the Flipped Classroom model. For economics and management lecturers, the Flipped Classroom model provides:

- development of competences in the field of digital design of educational content;
- increased efficiency in the use of classroom time;
- transition to student-centred and active learning;
- deepening the alignment of pedagogical practice with the requirements of DigCompEdu, particularly with regard to active learning and digital assessment.

For students, the expected results are:

- increased learning autonomy and responsibility for one's own results;
- deeper understanding of economic and management concepts through their practical application;
- developing analytical, communication and teamwork skills;
- forming digital competence relevant to professional activity [34; 35].

Table 7 – **Sequence of implementation of Flipped Classroom in the educational process**

Stages	Activity content
1. Designing educational content for independent study	The lecturer structures the theoretical material of the course in the form of digital resources for asynchronous processing: video lectures, podcasts, interactive presentations, analytical texts or short educational videos. For economics and management disciplines, it is useful to use examples from real business practice, data visualisation, dashboards and case studies
2. Organising out-of-hours student preparation	Students can work through the learning materials at their own pace using the LMS or open educational platforms. Teachers can use short online tests, surveys or self-assessment tasks to evaluate students' levels of preparation, adapting subsequent work accordingly
3. Active classroom work	Classroom or synchronous online time is dedicated to analysing case studies, discussing problematic issues, working in small groups, and simulating management and economic decision-making processes. The lecturer acts as a facilitator, directing the discussion and supporting students in developing their arguments and deepening their understanding of complex concepts
4. Feedback and reflection	The final stage involves providing feedback, discussing common mistakes, and reflecting on the learning process. For the teacher, this stage provides an opportunity to analyse the effectiveness of the digital resources and pedagogical approaches employed

Therefore, Flipped Classroom can be considered a universal model that combines the digitalisation of the learning process with improving the quality of teaching and the professional development of teachers in the fields of economics and management.

Microlearning

Microlearning involves presenting learning content in the form of short, self-contained digital modules that can be accessed at a time that is convenient for the teacher. This approach is particularly relevant for professional development in situations involving high workloads and rapid changes in the digital environment. Microlearning supports personalised educational trajectories, promotes self-regulated learning, and enables the timely updating of professional competencies, particularly digital and methodological ones.

It is particularly relevant for teaching economics and management in a rapidly changing digital economy where knowledge must be updated quickly and teaching activities must be combined with continuous professional development. Within the DigCompEdu framework, microlearning supports personalised learning, the development of digital resources and self-regulated educational activities [28].

Expected results of microlearning implementation. For economics and management lecturers, microlearning provides:

- increased flexibility and adaptability of the learning process;
- development of competencies in creating and using digital educational resources;
- support for their own professional development in the context of lifelong learning;
- adherence to the principles of DigCompEdu regarding personalisation and digital didacticism in pedagogical practice.

For students, the expected results are:

- The ability to learn at your own pace and according to your individual needs;

– Better absorption of material thanks to its fragmentation and practical orientation;
– Development of self-regulated learning skills;
– Increased readiness to use digital tools in professional activities [36; 37].

Table 8 – **Approximate sequence for implementing Microlearningresources**

Stages	Activity content
1. Decomposition of the learning content	The lecturer structures the learning material into short, logically coherent modules (5–15 minutes), each of which has a clearly defined learning objective (e.g. interpreting a financial indicator, working with a specific data analysis tool, understanding a management decision). For economic and management disciplines, it is advisable to focus on practical aspects and case studies
2. Development of digital micro-resources	Micro-modules can be delivered in the form of short videos, interactive presentations, infographics, mini-cases, tests or simulations. It is important that they are available in a digital environment (LMS, mobile platforms, cloud services), which allows teachers and students to integrate learning into their daily professional activities
3. Integrating microlearning into the learning process	Microlearning can be used as part of the preparation for lessons, to support independent study, as a revision tool or for quick knowledge updates. For economics and management lecturers, this creates the opportunity to adapt learning trajectories flexibly to the level of preparation and needs of students
4. Evaluation and reflection	Each micro-module is accompanied by a short evaluation tool (self-assessment, test, practical task), which allows you to track progress and adjust learning trajectories. For the teacher, this stage provides analytics on the effectiveness of the content and forms the basis for its continuous improvement

Thus, Microlearning is an effective tool for supporting the continuous professional development of teachers and students, ensuring the educational process can quickly respond to the challenges of the digital economy.

Peer learning and mentoring among teachers

Peer learning and mentoring are socially oriented models of professional development that involve teachers learning from each other through the exchange of experiences, shared reflection and support for professional growth. These approaches are the foundation of professional communities and promote the dissemination of innovative pedagogical practices in educational institutions. Studies emphasise that peer learning reduces barriers to the implementation of digital innovations, strengthens the professional identity of teachers and fosters a culture of collective learning, which is critical for the sustainable development of educational institutions.

For university lecturers, peer learning and mentoring are particularly valuable, as they promote the dissemination of practice-oriented methods, the integration of digital tools into teaching and the formation of a culture of continuous improvement. Within the framework of DigCompEdu, peer learning and mentoring are directly linked to professional interaction, reflective practice and the development of digital pedagogy [28].

Expected results of implementing peer learning and mentoring. For teachers in the context of the digital economy, these models provide:

- development of pedagogical and digital competence through mutual learning;
- reducing barriers to the implementation of innovative teaching methods;
- improving the quality of reflective pedagogical practice;
- alignment of professional development with components of DigCompEdu, particularly professional interaction and active learning.

For educational institutions, peer learning and mentoring facilitate:

- forming sustainable professional communities of teachers;
- disseminating best practices in teaching economics and management;
- developing an internal culture of quality and collaboration;
- supporting a system of continuous professional development (CPD) [38; 39].

Table 9 – **Sequence of implementation of peer learning and mentoring in teachers' activities and professional development**

Stages	Activity content
1. Forming professional pairs or small groups	At the first stage, pairs or small groups of teachers are formed, who can be grouped together according to their discipline (economics, management), pedagogical interests or level of digital competence. Combining experienced teachers with those who actively implement digital innovations creates conditions for mutual enrichment
2. Definition of the goals and focus of cooperation	Participants in peer learning or mentoring programmes jointly determine areas of professional development (e.g. using digital cases, analysing learning data, integrating PBL or Flipped Classroom). Clearly defining goals allows peer learning to be transformed from an informal process into a structured professional development process
3. Joint pedagogical activities and observations	The practical implementation of peer learning can include joint lesson planning, mutual lesson observation (in person or online), analysis of learning materials, and discussion of used digital tools and assessment methods. Mentoring involves more personalised support focused on the specific challenges faced by individual teachers
4. Reflection, feedback and dissemination of practices	A key stage is systematic reflection on the results of collaboration, sharing feedback and summarising the practices acquired. The results of peer learning and mentoring can be disseminated within departments, professional communities or teaching excellence centres, which helps to institutionalise innovations

Therefore, peer learning and mentoring not only serve as tools for the individual professional development of teachers, but also as important elements of institutional strategy for the development of human capital in the context of the digital transformation of education.

4.2. Examples of Successful Practices at the Admiral Makarov National University of Shipbuilding

As part of the implementation of international educational initiatives, including the DigEco, D-PBL and DETECT projects, lecturers at the National University of Shipbuilding named after Admiral Makarov (NUS) participated in the development and implementation of innovative learning models aimed at digital transformation of the educational process, integration of project-based approaches and development of digital competencies. The accumulated experience can serve as an example of the successful adaptation of international practices to the needs of economic and management education in Ukraine.

1. DigEco: Digitalisation of Economic Education for Sustainable Development in Ukraine and Tajikistan. The DigEco project (Digitalisation of Economic Education for Sustainable Development in Ukraine and Tajikistan) was implemented within the Erasmus+ CBHE programme and brought together universities from Ukraine, Tajikistan and European Union countries (Germany, Slovenia and Lithuania). The project aimed to update the content of economic education in line with the requirements of the digital economy and to create institutional conditions for developing digital competence among teachers and students.

Among the successful practices relevant to the methodological recommendations:

– modernisation of economics and management programmes with the integration of digital transformation of business, data analytics, digital platforms and innovative entrepreneurship themes.

- creation of digital economy laboratories and updating of material and technical bases for the implementation of modern EdTech solutions;
- conducting international training and study visits to promote the digital pedagogical competence of teachers;
- introducing project-oriented learning formats, including student competitions for digital business ideas and inter-university teams.

The practical result was the integration of digital tools into the teaching of economic disciplines and the formation of an environment for developing the competences defined by the DigCompEdu framework.

2. D-PBL and collaboration with the Aalborg Centre for Problem-Based Learning (Denmark). Within the D-PBL (Digital Project-Based Learning) project, NUCT collaborated with the Aalborg Centre for Problem-Based Learning (PBL), Aalborg University (Denmark) – an internationally recognised centre of expertise in problem-based learning. The University of Aalborg is one of the world's leading institutions in the implementation of PBL as a systemic model for organising the educational process.

Participation in the project enabled:

- adapt the Scandinavian PBL model to the conditions of Ukrainian economic education;
- integrate digital platforms for managing project activities into the learning process;
- develop methodological materials for teachers on facilitating teamwork, forming problem-based cases and evaluating project results;
- strengthen the international component of learning through joint online projects and experience sharing.

The involvement of Aalborg Centre for PBL expertise helped to transition from the fragmented use of PBL to a more systematic implementation of problem-based learning logic in economics and management teaching.

3. DETECT project: developing digital and entrepreneurial competencies. The DETECT (Digital Education and Competences Transformation) project was implemented by the Admiral Makarov National University of Shipbuilding in collaboration with international partners as part of initiatives aimed at strengthening the digital transformation of education and developing entrepreneurial competencies. The project's partner network included higher education institutions and expert organisations from European Union countries (Germany, the Czech Republic, Poland, Slovakia and Austria), as well as Israel, ensuring a multicultural exchange of experience and the implementation of European approaches to digital education. The project aimed to develop digital skills and foster entrepreneurial thinking in the context of the digital economy.

Key practices include:

- developing educational materials on digital literacy and the digital transformation of business;
- conducting workshops and training sessions for teachers and students on using digital tools in professional activities.
- creation of online resources to support self-learning and the development of digital skills.

The DETECT project strengthened the university's institutional capacity in digital education, supplementing the work of DigEco and D-PBL with practical tools for the continuous professional development of teachers.

Together, DigEco, D-PBL and DETECT formed a multi-level model for the professional development of economics and management lecturers.

The accumulated experience from the DigEco, D-PBL and DETECT projects provides a comprehensive foundation for designing an integrated model of professional development for economics and management teachers. This model combines digital competence development, project-based and problem-based learning approaches, international collaboration, and continuous upskilling

through innovative pedagogical practices. It reflects a transition from isolated initiatives to a systemic framework that supports educators in adapting to the demands of the digital economy and modern higher education. Figure 9 illustrates this model, highlighting its key components and the interconnections between them.

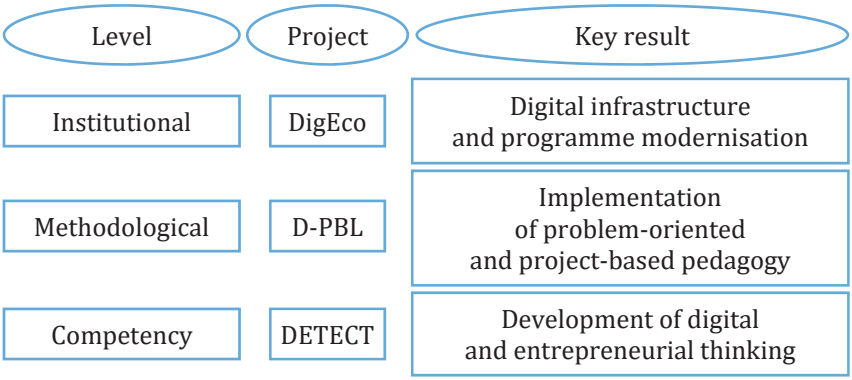

Figure 9 – Model of professional development for economics and management teachers

An effective digital transformation of teaching economics and management requires the simultaneous development of infrastructure, methodology and competencies. Only their integration ensures the sustainable professional development of teachers in the context of the digital economy and aligns with European approaches to developing digital pedagogical competence.

4.3. Development of Professional Communities of Teachers

In the context of digital transformation in education, the professional development of teachers cannot be limited to individual forms of continuing professional development. A sustainable effect is achieved through the creation of institutionally supported environments for professional interaction, such as Teaching

Excellence Centres (TEC) and Communities of Practice (CoP). These structures ensure the systematic exchange of experience, the development of digital pedagogy, and the integration of innovations in the teaching of economics and management.

1. Creation (or institutionalisation) of the Teaching Excellence Centre

Objective: coordination of continuous professional development (CPD) for teachers and methodological support for digital transformation of teaching.

Suitable functions of the centre:

- organisation of training sessions on digital pedagogy (LMS, Learning Analytics, AI in education);
- methodological support for the implementation of PBL, Flipped Classroom and microlearning.
- providing advice on the development of digital learning resources;
- supporting academic integrity and digital ethics;
- creation of an internal database of best practices.

Organisational recommendations:

- appoint a coordinator or working group from among the teaching staff;
- integrate the centre's activities into the system for ensuring the quality of education;
- ensure the regularity of activities (semester programmes, micro-courses);
- provide recognition for the participation of teachers in the centre's activities (certification, digital badges).

2. Development of Communities of Practice (Professional Practice Communities)

Objective: creation of a horizontal model of professional interaction that facilitates the exchange of experience and reflection on pedagogical activities.

Formats for implementation:

- regular methodological seminars for departments with case study presentations;

– thematic communities (e.g. 'Digital Economy', 'Analytics of Educational Data', 'PBL in Management');
– peer-learning groups and mentoring pairs;
– online platforms for discussing pedagogical decisions.

Key principles of CoP effectiveness:

– voluntary participation and internal motivation of participants;
– practical focus of discussions;
– regular interaction;
– Support from the university administration.

3. Integrating professional communities into the CPD system

To achieve a systemic effect, the activities of TEC and CoP must be aligned with the model of continuous professional development (Assessment → Planning → Training → Reflection → Certification).

It is recommended that:

– use the results of self-evaluation using DigCompEdu to form thematic groups;
– introduce a teacher portfolio as a tool for recording professional growth;
– ensure the possibility of scaling up successful practices at faculty and university levels.

Expected results of implementation for teachers:

– developing pedagogical and digital competence;
– raising confidence in implementing innovative learning models;
– reducing professional isolation;
– forming a culture of reflection and experience sharing.

For the university:

– improving the quality of the educational process;
– systematic organisation of innovative practices;
– strengthening the institutional culture of digital transformation;
– aligning professional development with European frameworks (DigCompEdu, CPD).

The development of professional communities of teachers should be considered as part of a long-term institutional strategy rather than as one-off events. Only by combining administrative support, internal motivation and methodological consistency can Teaching Excellence Centres and Communities of Practice become a catalyst for the sustainable professional development of economics and management lecturers in the digital economy.

4.4 Using Open Educational Resources (OER) and MOOCs as a Tool for Teachers' Professional Development

In the context of the digital economy, open educational resources (OER) and MOOCs are an effective tool for teachers' continuous professional development. Using them provides quick access to modern knowledge, international experience and innovative pedagogical practices without significant financial expenditure.

To systematically implement OER and MOOCs in the practice of teacher self-development, it is necessary:

1. Institutional recognition of OER and MOOCs as a form of professional development

1.1. Incorporate the possibility of crediting MOOC completion and OER use as part of professional development in internal regulatory documents.

1.2. Mechanisms for verifying results should be established (certificates, digital badges, teacher portfolios).

1.3. Integrate the results of learning into the system of assessment and evaluation of professional activity.

2. Directions for the use of OER and MOOCs for economics and management lecturers

2.1. Improving digital pedagogical competence:

– courses in digital didactic, instructional design and learning analytics;

– resources on the use of AI in education;
– materials for developing competences within the framework of DigCompEdu.

2.2. Updating the subject content:
– MOOCs on digital economy, financial technologies, innovation management, ESG, data-driven management;
– open lectures from leading universities (MIT Open Course Ware, Open Yale Courses, etc.).

2.3. Methodological development:
– courses on PBL, case-based learning and flipped classroom;
– open methodological materials from international universities.

3. Individual use model of OER/MOOCs

To ensure a systematic approach to self-development, it is advisable to apply the following algorithm:

Self-assessment → Goal setting → Course selection → Implementation → Reflection → Integration.

3.1. Conduct a self-evaluation of digital and pedagogical competencies (including DigCompEdu).
3.2. Set individual development goals (e.g. mastering educational data analytics).
3.3. Select relevant MOOCs or open resources.
3.4. Apply the knowledge obtained to your own course.
3.5. Conduct a reflection and record the results in your professional portfolio.

4. Integrating OER into your own educational courses

Teachers are recommended to:
– use open educational resources in accordance with Creative Commons licences;
– adapt open cases and video lectures to the national context;
– combine OER with their own authorial materials;
– form a blended content model (local + international).

Particular attention should be paid to academic integrity, correct referencing and legal aspects of using open resources.

5. Organisational support at university level

Recommended:

- create an internal catalogue of recommended MOOCs and OERs;
- conduct overview seminars on new open resources;
- stimulate the exchange of experience in using OER within professional communities;
- develop methodological recommendations on the legal aspects of open licences.

Expected results. Using OER and MOOCs will contribute to:

- increasing the digital and methodological competence of teachers;
- updating the content of courses in line with trends in the digital economy;
- integrating international experience into national educational practice;
- forming a culture of lifelong learning among academic staff.

Therefore, open educational resources and MOOCs should be considered not as an additional tool, but as a strategic element of the individual professional development trajectory of a teacher in the context of the digitalisation of higher education.

Best teaching practices and professional development for educators in the digital economy combine innovative pedagogical models, development of digital competence and institutional mechanisms to support continuous professional development. The analysed models (PBL, Flipped Classroom, Microlearning, Peer Learning and Mentoring) demonstrate that the professional development of economics and management lecturers is an integrated process in which the learning methodology, digital tools and reflective practice interact and reinforce each other.

The examples of international projects presented (DigEco, D-PBL, DETECT) confirm that effective transformation of teaching requires a combination of three components: digital infrastructure, modern pedagogical methodology and development of profes-

sional competencies. Meanwhile, the establishment of Teaching Excellence Centres, the development of professional communities, and the systematic use of OER and MOOCs create an environment in which the individual professional growth trajectory of a teacher is supported by the institution.

Therefore, the considered approaches and practices lay the practical groundwork for the development of a comprehensive system of continuous professional development (CPD) in higher education institutions. The next logical step is to move from describing individual tools and models to forming an organisational framework for their systematic implementation. This is the focus of the next section, which outlines recommendations for organising an effective Continuous Professional Development (CPD) system in an educational institution, taking into account the principles of continuity, individualisation, digital transformation and quality assurance.

Chapter V

RECOMMENDATIONS FOR THE ORGANISATION OF CONTINUOUS PROFESSIONAL DEVELOPMENT SYSTEMS

In the context of dynamic changes in the digital economy, the professional development of university lecturers can no longer be considered a discrete act of obtaining a certificate of professional development once every five years. It transforms into the concept of Continuous Professional Development (CPD): an ongoing, targeted process of developing professional, pedagogical and digital competencies throughout one's career. An effective CPD system in a higher education institution (HEI) should not only be based on external regulatory requirements, but also on the internal motivation of the teacher to improve themselves and the university's strategic goals for ensuring the quality of education. This requires the creation of a special digital culture and institutional environment that stimulates innovation, supports the exchange of experience and recognises various forms of professional growth.

5.1 Principles of Construction and Strategic Orientations of the CPD System in Educational Institutions

In the context of digitalisation, the construction of a viable system of continuous professional development for scientific and pedagogical staff must be based on the following fundamental principles:

– Continuity and systemisation: professional development is integrated into teachers' daily activities, combining formal, non-formal and informal learning.

- Individualisation and subjectivity: teachers act as active designers of their own development trajectory, based on the results of self-evaluation within the framework of DigCompEdu and their professional interests.
- Practical orientation: The training content should be directly relevant to the challenges of teaching economic disciplines, working with data, and using modern EdTech tools.
- Openness and collaboration: system encourages networked interaction and participation in professional communities (communities of practice), as well as the joint creation of educational content.
- Digital transformation of processes: Using Learning Management Systems (LMS) and data analytics to plan, monitor and certify the results of professional development.

Developing the aforementioned principles, it is necessary to define the key strategic guidelines that determine the direction of the CPD system in a modern university:

1. Forming an ecosystem of digital leadership. The strategic objective is to transition from the 'teacher as relay' model to the 'teacher as architect of digital educational environments' model. This requires not only proficiency in tools such as Zoom, Moodle and Kahoot, but also the ability to critically evaluate and integrate innovations, including artificial intelligence algorithms, into the design of educational programmes.
2. Synchronisation with the European educational space. Aligning with European standards (including the DigCompEdu framework and the Digital Education Action Plan) ensures the convergence of qualifications. A key milestone is the implementation of a micro-credentials system, which enables the flexible recognition of the results of non-formal learning and short-term courses.
3. The transition to analytically oriented management of development (Data-Driven Approach). Using educational analytics tools allows the administration of higher education institutions (HEIs) to make informed decisions regarding skill

shortages in their staff. The CPD strategy should be based on objective data: the results of student surveys, the activity levels of lecturers in the LMS and the results of the annual self-evaluation of digital competencies.

4. Promoting academic resilience. In times of crisis (pandemics, war), the ability of a teacher to quickly adapt learning content to asynchronous formats, ensure inclusive education and provide psychological support to learners in the digital space becomes a strategic priority.
5. Integration of scientific research and teaching (Research-Teaching Nexus). The CPD system should encourage teachers to use digital tools not only for teaching, but also for scientific communication, working with international databases (Scopus, Web of Science) and managing scientific projects, which will directly improve teaching quality.

The strategy of continuous professional development in a modern higher education institution (HEI) is transforming from a formalised procedure of 'accumulating hours' into a living tool for adapting teachers to the requirements of the digital economy. Implementing the above principles enables the creation of a flexible system in which professional growth is an integral part of corporate culture.

The success of implementing these guidelines depends on the synergy of three levels:

- individual (the willingness of the teacher to improve themselves);
- institutional (the availability of resources and a motivation system in the university);
- technological (use of modern digital platforms to support learning).

Ultimately, an effective CPD system not only enhances the personal brand of the teacher, but also increases the competitiveness of the university in the global market for educational services, ensuring the training of professionals capable of working in a high-tech environment.

5.2 The Cyclical Model of Teacher Development: from Diagnostics to Certification

To systematically organise CPD, a cyclical model is proposed that adapts the best European practices (KU Leuven, University of Tartu) to the needs of Ukrainian universities:

1. Assessment (evaluation): The initial stage is to diagnose the current level of digital competence. It is recommended that teachers use self-assessment tools based on DigCompEdu (e.g. SELFIE-for-TEACHERS or local questionnaires), which allow them to identify knowledge gaps.
2. Planning: Creating an individual professional development plan for a semester or year. This includes selecting specific modules, online courses (MOOCs), workshops, and mobility projects.
3. Training: direct acquisition of new methodologies (PBL, Flipped Classroom) and tools (AI, data analytics). Training can take place through internal Teaching Excellence Centres (TEC) or external platforms.
4. Reflection & Sharing : Applying the knowledge acquired in your own courses and discussing the results with colleagues in professional communities. This stage ensures the transformation of theoretical knowledge into practical experience.
5. Certification: Fixing achievements using digital portfolios, badges or traditional certificates, which are considered in the system of rating and rewarding teachers' work.
6. The implementation of such a model allows professional development to be transformed from a formal obligation into a strategic asset for both the teacher and the university in the context of digital transformation.

The schematic model below illustrates the cyclical and interdependent nature of all stages of professional development for teachers.

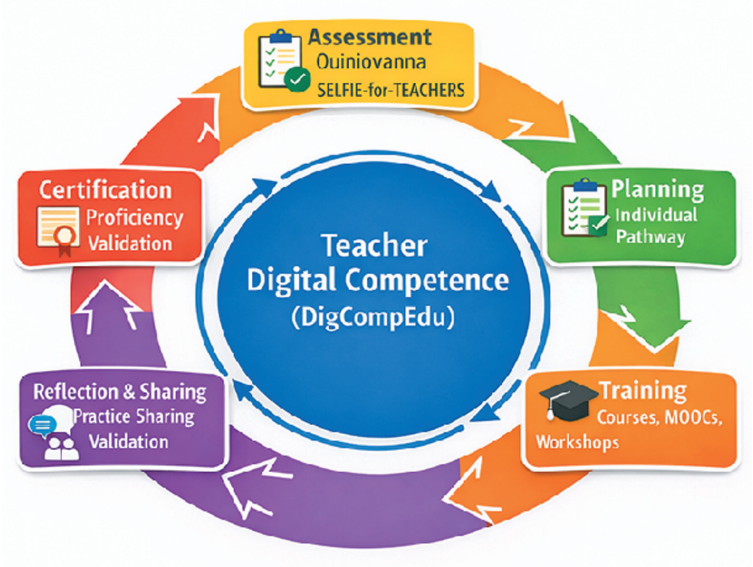

Figure 10 – Cycle model of a teacher's continuous professional development (CPD)

This model operates as a closed cycle (PDCA – Plan-Do-Check-Act), where the completion of one stage becomes the foundation for the next growth cycle.

1. Diagnostic core (Assessment): Located at the entrance to the cycle. Using SELFIE-for-TEACHERS tools allows you to obtain a 'digital fingerprint' of the teacher's competencies, making the learning process more targeted.
2. Trajectory design (Planning): Transition from evaluation results to the formation of an Individual Development Plan (IDP). Here, the teacher chooses between formal (courses) and informal (mentorship) methods.
3. Active learning (training): an intensive stage of immersion in new technologies (AI, Big Data, VR/AR) and methodologies (PBL). The role of university Teaching Excellence Centers as hubs for such training is important.

4. Practical implementation (Reflection & Sharing): The most important stage in transforming knowledge into a skill. The teacher tries out tools in their work with students and receives feedback within professional communities (Practice Communities).
5. Verification of results (certification): The result of the cycle is the acquisition of micro-qualifications or the completion of a digital portfolio (e-portfolio). This concludes the recognition stage and motivates the next step of self-evaluation at a higher level.

This visualisation shows that obtaining a certificate (Step 5) is not the end of the process. It provides a foundation for new self-evaluation (Step 1), but at a higher level of expertise (for example, transitioning from the 'Researcher' level to the 'Expert' level within the DigCompEdu framework). This cyclical process ensures that teachers can adapt to constant technological changes in the digital economy.

5.3 The Role of the University Administration: Motivation, Support, and the Creation of a Digital Culture

The effectiveness of the continuous professional development (CPD) system depends directly on the management's position within the higher education institution. The university administration acts as both a controlling body and a strategic architect, creating an environment in which digital transformation becomes an integral part of academic life.

Key areas of activity for the administration in developing the CPD system:

1. Creating a comprehensive digital strategy. The administration must clearly articulate the vision for the development of the university in the context of the digital economy. This involves integrating the professional development goals of teachers into the overall strategy of the higher education institution (HEI). When each employee understands which digital tools are prioritised

by the institution (e.g. the implementation of cloud services or AI technologies), the learning process becomes more targeted.

2. Formation of a motivation and recognition system. To overcome resistance to change, the administration should use a combination of material and non-material incentives.

- Material incentives: bonuses for developing quality digital content, grant support for innovative educational projects, priority computer equipment updates for active teachers
- Non-material incentives: consideration of CPD results when selecting candidates for positions, public recognition of achievements (e.g. annual 'Digital Ambassador of the University' awards), the opportunity to participate in prestigious overseas internships.

3. Ensuring Resource and Technical Support. Professional development is impossible without adequate infrastructure. The administration should ensure:

- the creation and maintenance of Teaching Excellence Centers or IT hubs where lecturers can receive immediate support and consultations 'on the spot';
- access to up-to-date licensed software, webinar platforms, and plagiarism detection systems;
- allocation of dedicated working time within the lecturer's workload specifically for developing digital competencies.

4. Cultivating 'digital culture' and safety. The administration should set an example of openness to experimentation. This includes creating an atmosphere of trust where mistakes when learning new technology are seen as part of the learning process. Another important aspect is the development of ethical codes of use for AI and digital hygiene policies that protect both the teacher and the student.

Administrative support tools (management checklist):

- Introduction of 'digital mentoring': Recruiting tech-savvy young lecturers or IT specialists to help colleagues with less experience (reverse mentoring).
- Regular digital climate audits: anonymous surveys of teachers regarding their needs and barriers to using technology.

– Simplifying bureaucratic procedures: Transitioning internal documentation and reporting on professional development to a fully digital format.

The university administration must transition from 'human resource management' to 'talent management in a digital environment'. Only with active support from the management will the CPD model cease to be declarative and become a real mechanism for ensuring the quality of education, where the teacher feels protected and motivated to grow constantly.

5.4 Using Open Educational Resources (OER, MOOCs) as a Tool for Teacher's Self-development

Studying the experience of leading European universities allows us to identify effective mechanisms for supporting continuous professional development that go beyond formal administration. In the global higher education landscape, the development of continuous professional development (CPD) policies is based on the integration of academic traditions with flexible technological solutions. Analysis of the activities of leading universities around the world allows us to identify three fundamental models that are relevant to any educational institution that aspires to leadership in the digital ecosystem.

1. KU Leuven case study (Belgium): Priority of pedagogical design and certification. At the Catholic University of Leuven, the CPD system is integrated into the overall teaching quality strategy. Key features:

– 'Education Professionalization' (EdPro): A specialised unit offering a multi-level training programme. New lecturers are required to participate in the 'Start to Teach' programme in order to pass their probationary period.
– Certificates of Teaching Excellence: The university has implemented an internal certification system that is recognised in personnel appointments. Particular attention is paid to blended learning and the use of digital tools for assessment.

As a result, an environment has been created where professional development is seen as an essential part of a professional's job.

2. Case study: University of Tartu (Estonia): Digital ecosystem and mentoring. Estonia is a leader in digital transformation in the EU, and the University of Tartu demonstrates a model of 'soft power' in managing CPD. This approach focuses on eliminating barriers between teachers and technology by developing supporting institutions.

- Network of educational technologists: Each institute (faculty) employs a specialist consultant who helps lecturers adapt courses for digital platforms. This removes the technical barrier and fear of new tools.
- Digital badges (Open Badges): The university uses a system of digital badges to confirm micro-competencies (e.g. 'Webinar Expert' or 'Moodle course designer'), which visualises the progress of the teacher in their professional profile.

This ensures the rapid scaling up of innovations and a high level of digital confidence among staff.

3. Case study: Warsaw School of Economics (SGH, Poland): Focus on economic specifics and AI. The Warsaw School of Economics is actively implementing a CPD policy that meets the requirements of the modern labour market:

- Centre for Open and Distance Studies (COED): Provides training for teachers in big data analytics and the use of simulation games in the education of economists.
- AI-oriented policy: SGH was one of the first to develop internal recommendations for the use of generative artificial intelligence, accompanied by a series of workshops for teachers on changing the paradigm of assessing students' knowledge.

This allows academic learning to be synchronised with the real demands of the digital economy.

In the Table 10, the universal CPD tools for adaptation in HEIs are organised to help form a policy of continuous professional development.

Table 10 – **European practices for adaptation in higher education institutions**

Tool / Case	Description of the practice	The expected effect for Ukrainian higher education institutions
Micro-credentials	Recognition of short courses through micro-qualifications	Flexibility in confirming skills, motivation for self-education
Peer Review of Teaching	Mutual evaluation and attendance of lessons by colleagues to exchange experience	Formation of a community of trust, dissemination of best didactic practices.
Teaching Portfolios	Digital portfolios of achievements that replace formal reports	Objective ranking of teachers based on their professional growth
Sandboxes	Temporary digital spaces for experimenting with new EdTech tools	Reduced stress when implementing innovations, a safe environment for mistakes

In the context of digitalisation, the role of higher education institution administrations is transforming from traditional personnel administration functions to the strategic management of human capital in a digital environment (Talent Management). The effectiveness of the continuing professional development (CPD) model is directly correlated with the level of institutional support: only by integrating professional development into the overall strategy for ensuring the quality of education can this model transform from a declarative concept into an effective mechanism for professional growth. Creating a safe and stimulating digital space minimises resistance to change and ensures sustained motivation among academic and pedagogical staff to continuously improve their professional competencies.

Chapter VI

CONCLUSIONS AND PRACTICAL RECOMMENDATIONS

Digital transformation in higher education has led to a significant change in the role of the teacher in the modern university. In the traditional educational model, the teacher was primarily a source of knowledge and an organiser of the learning process. In a digital educational environment, however, he becomes an active agent of innovation, a facilitator of learning and a designer of students' educational experience. This transformation requires not only proficiency in modern technological tools, but also the development of pedagogical, analytical and communication skills that ensure the effective integration of digital technologies into the learning process.

A key prerequisite for this transformation is the systematic development of digital competencies among teachers in line with international frameworks, such as DigCompEdu. Using such frameworks allows the process of professional development to be structured, levels of digital maturity to be defined, and contributes to the formation of unified standards for digital pedagogical training in the European educational space. The development of digital competencies among academic and scientific staff is one of the key factors in improving the quality of education and the competitiveness of universities in the global academic environment.

In this context, the implementation of Continuous Professional Development (CPD) systems takes on particular importance. These systems provide a structured and cyclical approach to improving a teacher's professional competencies, including stages of self-evaluation, planning an individual development path, training, professional reflection and certification. This model enables the

continuous updating of pedagogical practices, adaptation to new technological challenges and the dissemination of innovative teaching methods.

In addition to supporting the professional development of individuals, establishing institutional support ecosystems for teachers is an important factor in the digital transformation of education. Examples of such ecosystems include Teaching Excellence Centres, Communities of Practice, mentoring programmes and peer learning. They promote the dissemination of best practices in digital pedagogy, encourage an innovation culture and develop the collective professional potential of universities.

Thus, the modern university lecturer plays a pivotal role in the digital transformation of the educational process. They are responsible not only for conveying knowledge, but also for creating an innovative educational environment, developing students' digital literacy, and fostering the competencies necessary for success in the digital economy. Effectively realising this role requires a combination of individual professional activity, institutional support from the university, and integration of international digital pedagogical training standards.

Strategies for universities:

- creating a digital strategy for teaching and learning;
- integrating CPD into the system of quality management in education;
- encouraging international partnerships and academic mobility of teachers;
- monitoring the effectiveness of digital innovations.

The implementation of the aforementioned strategic areas requires a comprehensive approach to managing the digital transformation of universities. Firstly, the formation of a digital strategy for teaching and learning must clearly define the priorities for the development of educational technologies, integrate digital platforms into the learning process, and develop the digital infrastructure of the higher education institution. This strategy must be

aligned with the university's overall institutional development strategy and focus on improving the quality of educational services, increasing the accessibility of learning and enhancing the university's competitiveness at an international level.

Integrating a system of continuous professional development (CPD) into the system of internal quality assurance of education is an important mechanism for supporting innovative pedagogical practices. Including programmes to enhance the digital competence of teachers in internal audit procedures, accreditation processes and systems for evaluating the results of educational activities promotes systematic development of pedagogical skills and increases the effectiveness of the learning process.

Another important factor in the development of digital pedagogy is the expansion of international academic cooperation. The participation of teachers in international research and educational projects, academic mobility programmes, joint online courses, and networked educational initiatives promotes the exchange of experience and the dissemination of best practices in digital learning, as well as integrating universities into the global educational space.

Monitoring the effectiveness of digital innovation implementation should be based on systematic analysis of learning outcomes, student engagement, digital educational resource quality, and teacher digital competence levels. Regularly surveying participants in the educational process and evaluating the effectiveness of innovative pedagogical practices using educational data analytics enables universities to adjust their digital development strategies in a timely manner and ensure consistent progress in the digitalisation of education.

The effective digital transformation of universities requires a combination of strategic management and institutional support for teachers' professional development, as well as a systematic evaluation of the results of implementing digital educational innovations. In this context, teachers are not only users of digital technologies, but also active agents of change who shape a new learning culture and prepare professionals for the digital economy.

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FOR NOTES

Методичні рекомендації присвячені актуальним питанням трансформації професійної діяльності викладачів закладів вищої освіти в умовах цифровізації економіки та суспільства. У роботі проаналізовано зміну ролі сучасного викладача – від традиційного джерела знань до фасилітатора, ментора та дизайнера цифрового освітнього середовища. Окрему увагу приділено адаптації європейської рамки цифрових компетентностей DigCompEdu для викладачів економічних дисциплін, а також інтеграції інноваційних технологій, зокрема штучного інтелекту, систем управління навчанням (LMS) та аналітики освітніх даних у навчальний процес. Видання містить практичні підходи до впровадження передових методик навчання (PBL, Flipped Classroom, Microlearning) та рекомендації щодо розбудови систем безперервного професійного розвитку (CPD) на рівні університету.

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