

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

«Scientia et Societus»

Збірник наукових праць

Том 5, № 1
2026



Переяслав
2026

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

“Scientia et Societas”

Collection of scientific works

Vol. 5, No. 1
2026



Pereiaslav
2026

Засновник:

Університет Григорія Сковороди в Переяславі

*Рекомендовано до друку та поширення
через мережу «Інтернет» Вченою радою
Університету Григорія Сковороди в Переяславі
(протокол № 10 від 12 травня 2026 р.)*

Ідентифікатор медіа – R30-04674
Рішення національної ради України
з питань телебачення і радіомовлення
№ 1442, від 25.04.2024.

Журнал включено до Переліку наукових фахових видань України категорії «Б»
за наступною спеціальністю: А1 Освітні науки
(наказ Міністерства освіти і науки України № 928 від 11.06.2026).

Кластер: Розвиток людського капіталу, соціальні науки та журналістика

Журнал представлено у міжнародних наукометричних базах даних,
репозитаріях та пошукових системах: Google Scholar, Dimensions,
Національна бібліотека України імені В. І. Вернадського, OUCI (Open Ukrainian Citation Index),
EuroPub, WorldCat, Naver Academic, Crossref, Ulrichsweb Global Serials Directory, Erih Plus, J-Gate,
Litmaps, ScienceOpen

Адреса редакції:

Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
E-mail: mail@sets.com.ua
<https://sets.com.ua/>

ISSN 2786-6319 (print)
ISSN 2786-6327 (online)

Doi: 10.69587/ss/1.2026

Founder:

Hryhorii Skovoroda University in Pereiaslav

*Recommended for printing and distribution
via the Internet by the Academic Council
of Hryhorii Skovoroda University in Pereiasl
(Minutes No. 10 of May 12, 2026)*

Media identifier – R30-04674

**Decision of the National Council
of Television and Radio Broadcasting of Ukraine**

No. 1442, dated 25.04.2024.

The journal is included in the List of Scientific Professional Publications of Ukraine in category "B"
in the following specialty: 0111 Education Science
(Order of the Ministry of Education and Science of Ukraine No. 928 of 11 June 2026).

Cluster: Human Capital Development, Social Sciences and Journalism

**The journal is presented international scientometric databases, repositories
and scientific systems:** Google Scholar, Dimensions,
Vernadsky National Library of Ukraine, OUCI (Open Ukrainian Citation Index),
EuroPub, WorldCat, Naver Academic, Crossref, Ulrichsweb Global Serials Directory, Erih Plus, J-Gate,
Litmaps, ScienceOpen

Editors office address:

Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
E-mail: mail@sets.com.ua
<https://sets.com.ua/>

РЕДАКЦІЙНА КОЛЕГІЯ

Головний редактор:

Оксана Литвин | Кандидат фізико-математичних наук, доцент, Київський міський університет імені Бориса Грінченка, Україна

Заступник головного редактора:

Оксана Блавт | Доктор педагогічних наук, професор, Національний університет «Львівська політехніка», Україна

Національні члени редколегії:

Ольга Шапран | Доктор педагогічних наук, професор, Університет Григорія Сковороди в Переяславі, Україна

Наталія Оніщенко | Доктор педагогічних наук, професор, Університет Григорія Сковороди в Переяславі, Україна

Юлія Ситникова | Кандидат педагогічних наук, доцент, Харківський національний університет радіоелектроніки, Україна

Владислав Величко | Доктор педагогічних наук, професор, Донбаський державний педагогічний університет, Україна

Світлана Литвинова | Доктор педагогічних наук, професор, Донбаський державний педагогічний університет, Україна

Тетяна Волошина | Кандидат педагогічних наук, професор, Національний університет біоресурсів і природокористування України, Україна

Леся Збаравська | Кандидат педагогічних наук, доцент, Заклад вищої освіти «Подільський державний університет», Україна

Наталія Валко | Доктор педагогічних наук, професор, Херсонський державний університет, Україна

Міжнародні члени редколегії:

Да Бао | Доктор філософії у галузі досліджень мовчання та мовлення в освіті, креативної педагогіки, старший викладач, Університет Монаш, Австралія

Юрген Оелкерс | Доктор філософії у галузі філософії та історії освіти, почесний доктор наук, почесний професор, Цюрихський університет, Швейцарія

Михайло Калогіаннакіс | Доктор філософії у галузі природничої освіти, професор, Фесалійський університет, Греція

Сюесон Гао | Доктор філософії з прикладної лінгвістики, доцент, Університет Нового Південного Уельсу (UNSW), Сідней, Австралія

Адміраал Вільфрід | Доктор філософії, Центр дослідження професій, Університет Осло Метрополітан, Норвегія

Хосе Карлос Васкес-Парра | Доктор філософії, доцент, Технологічний університет Монтеррея, Мексика

Чжунфен Тянь | Доктор філософії, доцент, Університет Раттерса - Ньюарк, США

Габріель Кайзер | Доктор природничих наук, професор, Гамбурзький університет, Німеччина

Аріф Джем Топуз | Доктор філософії у галузі комп'ютерної освіти та навчальних технологій, доцент, Університет Ардахана, Туреччина

EDITORIAL BOARD

Editor-in-Chief:

Oksana Lytvyn | PhD in Physical and Mathematical Sciences, Associate Professor, Borys Grinchenko Kyiv Metropolitan University, Ukraine

Deputy Editor-in-Chief:

Oksana Blavt | Doctor of Pedagogical Sciences, Professor, Lviv Polytechnic National University, Ukraine

National Members of the Editorial Board:

Olga Shapran | Doctor of Pedagogical Sciences, Professor, Hryhorii Skovoroda University in Pereiaslav, Ukraine

Natalia Onishchenko | Doctor of Pedagogical Sciences, Professor, Hryhorii Skovoroda University in Pereiaslav, Ukraine

Yuliia Sytnykova | PhD in Pedagogical Sciences, Associate Professor, Kharkiv National University of Radio Electronics, Ukraine

Vladyslav Velychko | Doctor of Pedagogical Sciences, Professor, Donbas State Pedagogical University, Ukraine

Svitlana Lytvynova | Doctor of Pedagogical Sciences, Professor, Donbas State Pedagogical University, Ukraine

Tetiana Voloshyna | PhD in Pedagogical Sciences, Professor, National University of Life and Environmental Sciences of Ukraine, Ukraine

Lesia Zbaravska | PhD in Pedagogical Sciences, Associate Professor, Higher Educational Institution "Podillia State University", Ukraine

Nataliia Valko | Doctor of Pedagogical Sciences, Professor, Kherson State University, Ukraine

International Members of the Editorial Board:

Dat Bao | PhD in Silence and Talk Studies in Education, Creative Pedagogy, Senior Lecturer, Monash University, Australia

Jürgen Oelkers | PhD in Philosophy and History of Education, Doctor honoris causa, Professor Emeritus, University of Zurich, Switzerland

Michail Kalogiannakis | PhD in Science Education, Professor, University of Thessaly, Greece

Xuesong Gao | PhD in Applied Linguistics, Associate Professor, UNSW Sydney, Australia

Admiraal Wilfried | PhD, Centre for the Study of Professions, Oslo Metropolitan University, Norway

Jose Carlos Vazquez-Parra | PhD, Associate Professor, Tecnológico de Monterrey, Mexico

Zhongfeng Tian | PhD, Associate Professor, Rutgers University-Newark, United States

Gabriele Kaiser | Doctor rerum naturalium, Professor, University of Hamburg, Germany

Arif Cem Topuz | PhD in Computer Education and Instructional Technology, Assistant Professor, Ardahan Üniversitesi, Turkey

В. Коцур, А. Зленко, Я.Пшиченко

Agile-менеджмент як інструмент трансформації освітнього управління.....8

V. Kotsur, A. Zlenko, Ya. Pshychenko

Agile management as a catalyst for transforming educational administration8

Л. Шевчук, А. Григоренко, О. ШевчукСимуляційне навчання у вищій школі: оцінка сприйнятої ефективності
та готовності студентів до розвитку професійних компетенцій 20**L. Shevchuk, A. Hryhorenko, O. Shevchuk**Simulation training in higher education: Assessment of perceived effectiveness
and students' readiness to develop professional competencies 20**Ю. Полукаров, О. Полукаров**Підвищення обізнаності про екологічну безпеку
серед здобувачів вищої освіти 30**Yu. Polukarov, O. Polukarov**

Raising awareness of environmental safety among higher education students 30

І. Каменська, Н. Редзюк, М. БойкоКомпетентнісно орієнтоване навчання
як сучасна дидактична парадигма у педагогічній науці..... 42**I. Kamenska, N. Redziuk, M. Boiko**Competence-oriented learning as a contemporary didactic paradigm
in pedagogical science 42**О. Бокшиц, В. Якуба**Цифрова трансформація освітнього середовища університетів:
педагогічні виклики та соціальні наслідки..... 56**O. Bokshyts, V. Yakuba**Digital transformation of the university educational environment:
Pedagogical challenges and social consequences 56**І. Мисан, С. Дем'яненко**Ігрова діяльність як засіб розвитку пізнавальної активності
дітей дошкільного віку 70**I. Mysan, S. Demianenko**

Play activity as a means of developing cognitive activity in preschool children..... 70

В. ДударОсвіта як чинник формування соціальної відповідальності молоді
в умовах сучасних суспільних трансформацій 86**V. Dudar**Education as a factor in shaping the social responsibility of youth
in the context of contemporary societal transformations 86**О. Дудар, Я. Щоголев**Освітні комунікації в цифровому суспільстві:
нові формати взаємодії між викладачем і студентом..... 102**O. Dudar, Ya. Shchogolev**Educational communications in the digital society:
New formats of interaction between lecturer and student 102

**Vitalii Kotsur***

Doctor of Historical Sciences, PhD in Political Sciences, Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0001-6647-7678>

Alla Zlenko

PhD in Historical Sciences, Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0002-5586-3984>

Yana Pshychenko

Postgraduate Student
Wrocław University of Economics and Business,
53-345, 118/120 Komandorska Str., Wrocław, Poland
Lecturer
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0009-0001-6052-7897>

Agile management as a catalyst for transforming educational administration

Abstract. The aim of this study was to examine the potential of Agile management as a tool for transforming educational management. The research analysed the impact of Agile approaches on the organisation of the educational process and management practices in higher education institutions. The methodology involved a comparative analysis to assess the effectiveness of Agile management implementation in education, as well as a SWOT analysis to identify the strengths, weaknesses, opportunities, and threats associated with this approach. The key findings indicated that adopting Agile management enhances flexibility in educational project management, reduces decision-making time, and improves communication among all participants in the educational process. The implementation of Agile approaches has enabled educational institutions to respond more swiftly to curriculum changes, adapt to new technologies, and align with labour market demands. Additionally, the study found that the use of Agile methods positively influenced the motivation of both students and teachers, fostering a more open and collaborative learning environment. Students reported increased engagement in learning, while teachers experienced improved interaction with students, leading to greater satisfaction with the educational process. The findings highlighted the significant potential of Agile management in enhancing the efficiency of higher education institution management. Further improvement and adaptation of these practices to the specific conditions of educational institutions will support the sustainable development of education in the future. This study reinforces the importance of developing new management strategies to optimise the organisation of the educational process, enhance student satisfaction, and promote the innovative development of educational institutions

Keywords: leadership in the educational environment; digital transformation of universities; development of academic potential; management of innovative projects; education quality control system

Suggested Citation:

Kotsur, V., Zlenko, A., & Pshychenko, Ya. (2026). Agile management as a catalyst for transforming educational administration. *Scientia et Societis*, 5(1), 8-19. doi: 10.69587/ss/1.2026.08.

*Corresponding author (kotsurv@ukr.net)



INTRODUCTION

In the current context of higher education transformation, innovative management approaches are becoming key to ensuring the efficiency of educational institutions. Traditional management methods often fail to address the new challenges arising from rapid changes in the educational environment and the evolving demands of the labour market. Agile management, originally developed for the IT industry, is gradually gaining traction in the management of educational institutions due to its capacity to adapt swiftly to change and enhance the flexibility of management processes. Continuous feedback and ongoing improvement enable educational institutions to respond more effectively to the needs of students and employers, optimise educational processes, and enhance the quality of educational services. This approach also fosters student engagement in the learning process and improves interactions among all participants within the educational environment.

Numerous contemporary scholars have explored this topic, offering diverse perspectives. For instance, E. Boti *et al.* (2021) highlighted that developing skills through Agile capstone projects allows students to apply theoretical knowledge in practice, which is a crucial aspect of professional preparation. Similarly, A. Cojocaru *et al.* (2022) examined the impact of Agile management in physical education, noting that the implementation of Agile approaches can enhance learning outcomes and student engagement. The application of Agile management in higher education is expanding, demonstrating considerable potential for improving both learning processes and management practices. K. Abang *et al.* (2022) proposed a document management system for private higher education institutions, underscoring the importance of integrating technology to optimise administrative functions and enhance access to educational resources. Furthermore, H. Jamal Al-Lail & E. Mohamed (2019) emphasised the significance of innovation in higher education; however, the impact of flexible approaches on the quality of the educational process across different institutions remains insufficiently explored.

L. Dong (2023) emphasised the importance of incorporating client projects to develop Agile competencies, indicating that such projects contribute to the acquisition of practical skills and better prepare students for real-world challenges. Additionally, D. Francis (2022) analysed the Agile paradigm in the context of the organisational development of higher education institutions, stressing that Agile management methods enable universities to adapt more rapidly to environmental changes. The study by P. Ivetic & J. Ilic (2020) argued that project management based on Agile principles can significantly modernise higher education institutions, highlighting the necessity of training educators in Agile methodologies. Furthermore, V. Kate *et al.* (2023) underscored the importance of employing Agile methodologies in the development of educational software, though the question of full integration into the educational process remains unresolved.

R. Jardim *et al.* (2023) examined collaboration within a virtual learning environment using Agile practices, demonstrating the potential of Agile methods in fostering teamwork in distance learning. Likewise, M. Levy *et al.* (2021) emphasised that Agile methods can be instrumental in developing students' digital skills, which are critically important in today's technological landscape.

A study by V. Duarte *et al.* (2021) examined the implementation of Agile methodologies in the educational process for engineering students. The researchers' findings indicated that such approaches positively influence the development of teamwork skills; however, the extent to which Agile principles are fully integrated into education remains an open question. M. Fernandez *et al.* (2020) investigated the application of Agile methodologies in instructional design, focusing on enhancing students' digital competencies. Similarly, B. Lalic *et al.* (2021) explored the integration of game elements in education within the framework of Agile methodologies. Additionally, A. Lopez-Alcarria *et al.* (2019) conducted a systematic review of the use of Agile methods, with a particular emphasis on fostering sustainable competencies. The researchers highlighted the importance of embedding sustainable development into curricula, yet the effectiveness of such approaches across different educational institutions remains insufficiently explored.

Although the aforementioned studies highlight key aspects of Agile management implementation in higher education, several questions remain that require further investigation. In particular, the impact of Agile approaches on the development of students' professional skills remains insufficiently explored. Additionally, it is crucial to examine the effectiveness of Agile methods across different academic disciplines, as outcomes may vary significantly depending on the nature of the curriculum. Moreover, the influence of Agile management on collaboration between teachers and students, as well as its effects on motivation to learn in an environment of constant change, remains a pertinent issue. Furthermore, existing research has largely overlooked the cross-cultural dimensions of implementing Agile methods in educational processes, which is becoming increasingly significant given the globalisation of higher education and the growing diversity of the student body. Questions also persist regarding the long-term implications of Agile approaches for academic success and the professional development of graduates. This underscored the need for further research and continuous monitoring to evaluate the effectiveness of these innovations in higher education. The aim of this study was to assess the implementation of Agile management in the transformation of higher education management. Research objectives were (1) to investigate the core principles of Agile management; (2) to examine current management trends in higher education institutions; (3) to evaluate the advantages and disadvantages of applying Agile management in educational institutions.

MATERIALS AND METHODS

The study was conducted using statistical methods, comparative analysis, and SWOT analysis. It was carried out at the Hryhorii Skovoroda University in Pereiaslav in 2024 to assess the effectiveness of Agile management in the administration of educational processes. The study involved 60 respondents, comprising 30 students and 30 teachers. Among the students, there were 15 men and 15 women, aged between 18 and 24. The group of teachers included 16 men and 14 women, aged between 30 and 55. The respondents were divided into two groups: an experimental group and a control group. The experimental group consisted of 15 students and 15 teachers who applied Agile management principles. The control group, also comprising 15 students and 15 teachers, continued to operate within the traditional management framework typical of higher education institutions. Throughout the study, fundamental ethical standards were upheld. All respondents participated voluntarily and were fully informed about the study's purpose and objectives. Prior to the experiment, they provided written consent to participate. Anonymity and confidentiality were ensured to protect the participants' personal information, and all data were used exclusively for scientific purposes. Moreover, all forms of discrimination or bias based on gender, age, or other characteristics were strictly avoided.

The implementation of Agile management in the experimental group involved the use of flexible planning methods, regular meetings (stand-ups) to discuss progress, rapid task adjustments, and the active participation of both teachers and students in decision-making. Students and teachers collaborated to solve tasks using Agile tools, including Scrum and Kanban, to manage processes. In contrast, the control group followed a standard hierarchical management system, where decisions were made by the institution's administration, and students carried out tasks according to fixed plans. The study lasted for one semester, after which the results of the two groups were compared. The primary evaluation indicators included the level of student engagement, teacher satisfaction with the educational process, flexibility in decision-making, and the overall effectiveness of management processes. The results indicated that participants in the experimental group reported improved communication, a faster response to changes, and greater flexibility in completing tasks. Teachers in this group observed an increase in student involvement in decision-making processes and a reduction in bureaucratic obstacles. To evaluate the implementation of Agile management in the administration of educational processes a SWOT analysis was conducted. This method enabled the systematisation of data concerning the strengths and weaknesses, as well as the opportunities and threats, associated with the transition to Agile management. The SWOT analysis facilitated the identification of key factors influencing the effectiveness of management practices in a higher education institution.

RESULTS

Theoretical foundations of Agile management in the administration of educational institutions

In the context of globalisation and rapid technological advancement, higher education institutions must quickly adapt to change to remain competitive in the educational market. Traditional management approaches in higher education often lack the necessary flexibility to address emerging challenges posed by the evolving needs of modern society and the labour market. As a result, innovative management methods, such as Agile management, are gaining increasing recognition. Agile management enables institutions to respond swiftly to changes, implement innovations effectively, and enhance the efficiency of the educational process through flexible organisational approaches. The study of this approach within higher education is particularly relevant, as it presents new opportunities for improving management quality, strengthening communication among stakeholders in the educational process, and developing more adaptive and competitive curricula.

Agile management is a modern approach to administration that emphasises flexibility, rapid adaptation to change, and continuous process improvement. Originally developed for the IT sector, this methodology has gradually been adopted across various industries, including higher education management. Agile management is founded on the principles outlined in the Agile Manifesto, created in 2001. Its primary objective is to foster effective collaboration among team members, enable swift responses to change, and deliver maximum value to end users. One of Agile's core values is a strong focus on people and interactions. The approach prioritises not only the achievement of final outcomes but also the process through which teams work to attain these results. Direct communication, teamwork, and trust among team members facilitate the rapid resolution of issues, particularly in responding to new challenges that arise during project implementation. Another fundamental principle of Agile is adaptability. Agile management enables teams to adjust swiftly to both external and internal changes, moving away from rigid plans while anticipating the need for modifications in workflows. This adaptability is especially relevant in higher education institutions, where shifts in educational programmes, student requirements, or labour market demands can occur unexpectedly. Compared to traditional management approaches, Agile management allows educational processes to be adapted more efficiently to new conditions and emerging needs.

Agile principles also place a strong emphasis on feedback and continuous improvement. This approach involves the regular review of processes and outcomes, enabling ongoing enhancements rather than waiting until a project is completed. In the context of higher education institutions, this may involve systematically evaluating curricula, teaching methods, and administrative processes with the aim of continuous development and refinement. A key consideration is how Agile management principles can be effectively implemented in the administration of higher

education institutions. The application of Agile principles in this sector presents new opportunities for enhancing the efficiency of both administrative and educational processes. Rather than relying on a traditional hierarchical management structure, Agile promotes a more flexible model that facilitates rapid adaptation to changes in both internal and external conditions. This adaptability is particularly crucial for higher education institutions, as they frequently encounter evolving challenges, including shifting labour market demands, technological advancements, emerging pedagogical approaches, and changing student expectations.

One of the key features of Agile in education management is its capacity to facilitate the rapid review and updating of curricula. Traditional educational models often follow a rigid structure, which does not always allow for swift modifications to course content or teaching methods. In contrast, the Agile approach promotes short cycles of review and curriculum adjustments based on regular feedback from students and the labour market. This ensures a more relevant and contemporary education that aligns with current societal and professional needs. Another significant feature of Agile management is its enhancement of communication among various stakeholders in the educational process, including administration, teachers, and students. Agile encourages the formation of small yet highly effective teams, in which each participant plays an active role in decision-making. In higher education institutions, this can translate into greater involvement of teachers and students in the development of new courses, programmes, or research projects. Such an approach not only strengthens communication but also fosters the emergence of innovative ideas and solutions that might otherwise be overlooked within a traditional hierarchical structure. Agile tools, such as daily meetings, short planning cycles, and continuous improvement mechanisms, can be seamlessly integrated into the educational process to enhance its effectiveness. For instance, regular meetings between teachers, administration, and students can serve as an efficient platform for discussing current challenges, resolving issues promptly, and improving the educational process in real time.

The implementation of Agile management in the administration of educational institutions not only enables the adaptation of processes to changing conditions but also significantly enhances the efficiency of both administrative and educational activities. One of the primary advantages of this approach is the acceleration of decision-making processes. In traditional management models, the approval of new courses or programmes can be slow and bureaucratic. Agile methodology helps to reduce these timeframes by focusing on fast and flexible cycles of planning and implementing changes. This is particularly important for institutions seeking to remain competitive and relevant amid the rapid advancement of new technologies and evolving labour market demands. Another key advantage is the improvement of communication among all stakeholders in the educational process. Agile is centred on open dialogue and continuous feedback, ensuring that the needs and

perspectives of students, teachers, and administrators are taken into account. As a result, educational institutions can better respond to student expectations, integrate modern teaching methods, and offer more personalised approaches to educational programmes. This flexibility leads to curricula that are more adaptable to contemporary requirements, ultimately increasing the satisfaction of both students and teachers. Agile management fosters a more dynamic and responsive education system. In today's rapidly changing world, the ability to swiftly adapt to new realities is a critical advantage, and Agile facilitates this through its flexible methodologies. Higher education institutions that embrace Agile principles can more effectively restructure management processes, reorganise curricula, and enhance interactions with both teachers and students.

Despite the numerous benefits that Agile management offers to higher education, it is not a one-size-fits-all solution for all institutions. Its implementation may present certain challenges that must be carefully considered when introducing such changes. While Agile management can significantly enhance the flexibility and efficiency of educational processes, adapting it to traditional higher education structures can be complex. One of the primary challenges is the lack of experience among teachers and administrators in applying this approach. Most educational institutions operate under well-established procedures and management models that do not readily accommodate rapid changes in plans and approaches. Implementing Agile requires managers and staff to undergo a substantial shift in mindset and organisational culture, a transition that may not always be met without resistance. Traditional management systems in educational institutions are typically based on hierarchical structures, where decisions are made at higher levels and passed down through the organisation. Agile, by contrast, promotes more horizontal management structures, granting teams greater autonomy in decision-making. This shift can lead to conflicts in institutions where staff are unaccustomed to making independent decisions or lack the necessary skills to work effectively in such an environment.

Another challenge is the substantial resources required to implement Agile methodologies. Despite the inherent flexibility of this approach, its adoption may necessitate additional financial and human resources. Staff training, the introduction of new technological solutions for process management, and the adaptation of infrastructure to meet new requirements can impose significant costs on higher education institutions. For some institutions, these financial and logistical demands may act as barriers to the adoption of Agile management. Furthermore, Agile requires continuous feedback and close interaction among all participants in the process, which can be particularly challenging in large universities with numerous students and faculty members. Ensuring transparent communication and regularly updating processes in such environments may prove difficult, especially if the institution lacks the necessary tools or experience in implementing Agile methodologies.

The role of Agile management in the innovative development of the educational process

To conduct a more detailed analysis of the implementation of Agile management in higher education institutions, a

comparative analysis was undertaken to evaluate the effectiveness of this innovative approach. As part of the study, data were collected on various aspects of Agile implementation. The findings of the study are presented in Table 1.

Table 1. Comparative analysis of the implementation of Agile management and a standard management system in a higher education institution

Evaluation indicators	Experimental group, implemented Agile management	Control group, standard management system
Management methods	Use of flexible planning, regular meetings (stand-ups), joint decision-making by teachers and students, Scrum, Kanban	Hierarchical management system, fixed plans, decisions are made by the administration, students complete tasks according to a pre-approved plan
Student engagement	High, students actively participated in decision-making, worked together with teachers to solve problems	Low, students followed given instructions without participating in the decision-making process
Teacher satisfaction	High, teachers noted increased student motivation and reduced bureaucratic processes	Average, teachers had limited influence on management processes, experienced bureaucratic difficulties
Flexibility in decision-making	High, due to the ability to quickly adjust tasks and make joint decisions	Low, decisions were made by the administration with minimal involvement of teachers and students
Efficiency of management processes	High, due to faster adaptation to changes, improved communication between process participants	Low, slow response to changes, limited communication between students, teachers and administration
Overall satisfaction with the process	High, participants noted improvements in communication processes and simplification of management tasks	Low, participants expressed dissatisfaction with the rigidity of the system and the lack of opportunity to influence decision-making

Source: authors' development

The implementation of Agile management in the experimental group led to improved communication, greater flexibility in decision-making, increased student engagement, and overall satisfaction with the management process compared to the control group, which adhered to the standard hierarchical model. Agile management in higher education institutions plays a significant role in fostering innovation, which has become a crucial factor in meeting modern requirements for educational programmes and research. Universities that actively apply Agile principles can respond more rapidly and effectively to changes in the educational environment, driven by continuous technological advancements and evolving labour market demands. One of the key advantages of Agile is its capacity to support short-term projects and an iterative approach, enabling universities to quickly test new ideas and concepts. This facilitates the rapid launch of innovative educational programmes that can be adapted based on feedback from students and teachers. For instance, new courses can be developed in close collaboration with employers, ensuring that training aligns with industry needs and remains practically relevant.

Agile approaches also encourage the formation of interdisciplinary teams, bringing together experts from diverse fields to develop new programmes and research initiatives. Such collaboration not only enhances the quality of education but also expands opportunities for innovation in research, as the integration of different perspectives and expertise fosters more creative solutions and outcomes. Moreover, Agile enables universities to implement

the principles of continuous improvement, ensuring that programmes are regularly updated based on feedback and assessment results. This approach enhances student satisfaction and provides them with higher-quality knowledge that aligns with contemporary professional and academic requirements. The implementation of Agile management can also drive the development of innovative technologies, such as online education, gamified learning, and the use of data analytics to enhance the educational process. By adopting Agile principles, higher education institutions can position themselves at the forefront of technological advancements, thereby increasing competitiveness in the global education market. Agile management not only supports the development of innovative educational programmes but also fosters a conducive environment for the active integration of new technologies and methodologies that align with contemporary market demands. This adaptability enables higher education institutions to respond swiftly to change, a crucial factor for the successful operation in an increasingly dynamic world.

Adapting Agile management to different forms of learning is a crucial aspect, as modern higher education institutions increasingly incorporate not only traditional face-to-face classes but also online education, blended learning, and other innovative formats. The flexibility of Agile enables universities to integrate this approach into various learning models, enhancing both their efficiency and accessibility. Online education, which has gained significant popularity, necessitates the adaptation of traditional teaching and management methods to new

conditions. Agile allows universities to respond swiftly to changes in student needs, offering them knowledge in a format that best suits preferences of students. For example, in the development of online courses, an iterative approach can be applied, allowing different content formats – such as video lectures, interactive modules, and discussion forums – to be tested and refined based on student feedback. Blended learning, which combines traditional face-to-face instruction with online formats, can also benefit from Agile principles. In this context, universities can design courses that integrate the best practices of both methods, ensuring a flexible and efficient learning process. Agile methodologies facilitate the structuring of blended learning in a way that enhances student interaction with both instructors and course materials. The use of technology to provide feedback and support collaborative projects can further aid students in mastering content while developing teamwork skills. Another significant advantage of Agile adaptation is the ability to rapidly introduce new technologies and tools into the learning process. The incorporation of gamification, artificial intelligence, or virtual reality elements into educational programmes can greatly enhance student engagement. Agile methodologies allow for the seamless integration of these technologies by testing them in small groups to evaluate their effectiveness before implementing them on a larger scale.

Adapting Agile to different learning environments also requires considering the individual needs of students. By applying Agile principles, educators can design personalised learning pathways that enable students to progress at a pace that best suits them. This can be achieved by allowing students to select topics of interest for deeper exploration or by forming self-organised teams to collaborate on projects. In this way, Agile fosters a more adaptive and student-centred learning environment. An essential aspect of integrating Agile into education is the creation of an open and supportive environment for idea exchange and feedback. Agile methods, such as regular meetings and feedback sessions, can enhance interaction between students and teachers, thereby improving the overall quality of learning and fostering the development of critical thinking skills. Thus, adapting Agile to diverse learning environments not only enhances the efficiency of the learning process but also makes education more accessible and tailored to individual student needs. This approach enables higher education institutions to respond effectively to the challenges of the modern educational landscape, equipping students with high-quality knowledge and skills that align with labour market demands.

The implementation of Agile management in higher education institutions serves as a powerful tool for enhancing the quality of education. The core principles of flexibility, teamwork, and continuous improvement underpin Agile and contribute to the development of a learning environment that aligns with both student needs and the demands of the modern labour market. Agile fosters a student-centred approach, which is fundamental to delivering

high-quality education. By employing Agile methods, universities can implement a more individualised approach to learning. Students are actively involved in shaping the educational pathways, selecting topics and formats that align with their interests and professional aspirations. This not only increases motivation but also facilitates deeper engagement with the subject matter, leading to improved comprehension and retention of knowledge. The Agile methodology also promotes continuous feedback between students and educators. Regular meetings, discussion sessions, and progress assessments enable teachers to respond promptly to students' challenges and adapt course content accordingly. This ensures that students receive timely support while enhancing the overall quality of learning, as educators can adjust programmes based on students' real-time needs as they emerge throughout the learning process. Furthermore, Agile approaches facilitate the integration of practical experience into educational programmes. For example, project-based learning enables students to engage with real-world challenges, allowing them to apply theoretical knowledge in practice. This not only enhances the skill set but also better prepares students for the professional challenges they may encounter in future careers. It is also important to highlight that the application of Agile in education can significantly reduce bureaucracy and formalism, which are often prevalent in traditional educational systems. By shifting the focus towards learning outcomes, institutions can move away from unnecessary formalities and concentrate on delivering high-quality education. This creates a more dynamic and productive learning environment in which students feel empowered to express thoughts and ideas freely.

In addition, Agile management fosters the development of teamwork and collaborative learning, which are essential aspects in the formation of key skills. Students learn to work effectively in groups, share knowledge and ideas, and enhance the ability to collaborate, think critically, and engage in creative problem-solving. These skills are particularly crucial in today's world, where teamwork is the norm and effective communication is fundamental to success. Agile management serves as a powerful tool for enhancing the quality of education in higher education institutions. Its principles contribute to the creation of a more flexible, adaptive, and student-centred learning environment that supports the development of essential skills and competencies in future professionals. Through the implementation of Agile, universities can significantly improve the quality of the educational programmes, ensuring they remain relevant, practically oriented, and aligned with contemporary professional demands.

Assessment of Agile management through SWOT analysis

To better assess the implementation of Agile management in the management of educational processes at the university, a SWOT analysis was conducted. It allowed us to identify key factors that affect the effectiveness of Agile management in an educational institution.

The results of the SWOT analysis are presented in Table 2, which systematizes the strengths and weaknesses,

opportunities and threats associated with the transition to Agile management.

Table 2. SWOT analysis of the implementation of Agile management in the management of educational processes

Strengths	Weaknesses
Flexibility in decision-making and rapid adaptation to changes in educational processes; Increased involvement of students and teachers in management decisions; Improved communication between all participants in the process; Reduction of bureaucratic obstacles; Use of modern tools for effective process management, such as Scrum and Kanban	Possible difficulties in implementing Agile management due to habituation to traditional hierarchical systems; The need for additional training of staff to work with Agile methods; High requirements for constant coordination and meetings; Lack of previous experience of working with Agile principles among teachers and administration
Opportunities	Threats
Increasing the efficiency of educational processes through flexible management; Ability to quickly respond to changes in the educational environment and labor market; Creation of an innovative educational model that attracts new students and teachers; Improving the image of the institution through the implementation of modern management technologies	Resistance from part of the staff accustomed to the traditional management system; Possible technical problems with the implementation of new management tools; Risk of slowing down processes due to insufficient training of the team for new methods; Dependence on the quality of communication tools for the implementation of Agile approaches

Source: authors' development

The SWOT analysis revealed that the implementation of Agile management has the potential to enhance flexibility, communication, and efficiency in educational processes. However, overcoming resistance to traditional management approaches and ensuring adequate staff training are essential for the successful adoption of Agile principles. An analysis of practical cases of successful Agile implementation in higher education institutions highlights that success depends not only on the proper adaptation of the approach but also on the development of effective implementation strategies. Understanding how to apply Agile within the specific context of a university or educational programme is a critical step in maximising its benefits. To successfully integrate Agile management into higher education institutions, it is essential to develop a well-defined implementation strategy that considers both organisational culture and the unique characteristics of the educational process.

The first step is to prepare staff for change. This involves providing training and professional development programmes for administrators, faculty, and even students, ensuring that all stakeholders understand Agile principles and can apply them effectively in their roles. Shifting mindsets and fostering a new organisational culture is a crucial initial stage in achieving the successful integration of Agile. As demonstrated by international examples, many challenges arise due to resistance to change or a lack of understanding of how the Agile approach functions. Therefore, it is important for universities to establish structured plans for the gradual adoption of Agile, incorporating phases of familiarisation with new methodologies and their progressive integration into both administrative and educational activities. Another key strategy is the formation of

small teams to initially test Agile methods in practice. This approach helps to avoid disruptive organisational changes while allowing institutions to assess the effectiveness of new methodologies through pilot initiatives. For example, Agile can be introduced in small project teams tasked with developing new courses or modernising existing educational programmes. If these teams achieve positive results, they can serve as exemplary models for other departments or faculties, facilitating a smoother transition to Agile management across the institution.

A crucial factor for the successful implementation of Agile is the establishment of regular monitoring and process adjustments. Agile strategies are based on continuous improvement through feedback, making it essential to implement mechanisms for ongoing evaluation and refinement. This may include regular team meetings where achievements, challenges, and potential solutions are discussed. Such an approach not only enables institutions to respond promptly to difficulties but also ensures maximum flexibility and efficiency in the Agile implementation process. Many universities that have successfully integrated Agile management utilise specialised project and team management tools, such as software platforms for organising daily meetings, planning tasks, and tracking progress. The adoption of such technologies enhances workflow organisation and ensures transparency in processes. A strategic approach to implementing Agile in higher education institutions involves several key stages: staff training, gradual testing on small-scale projects, continuous monitoring and process adjustments, and the use of technological tools to support Agile management. The systematic implementation of these steps will enable educational institutions to effectively integrate Agile management,

fostering high adaptability, innovation, and competitiveness in today's rapidly evolving educational landscape.

DISCUSSION

Agile management is a modern and dynamic approach that emphasises flexibility, adaptability, and active collaboration among all participants in the process. This methodology involves continuous monitoring and adaptation to change, making it highly effective in a rapidly evolving educational environment. Through regular meetings, rapid information exchange, and inclusive decision-making, Agile management fosters a more collaborative and participatory learning environment. In addition to enhancing the efficiency of management processes, this approach stimulates innovation in higher education. The study by J. Milićević *et al.* (2019) highlighted the significance of the Scrum Agile Framework in e-business project management, yielding results comparable to the results of the study. The researchers argued that the application of Agile methodologies enhances students' management skills, contributing to their professional development. The findings underscored the importance of student involvement in management processes, as this fosters the development of key competencies required in modern education.

The study conducted by A. Orsdemir *et al.* (2019) examined the role of influence in Agile management within the context of educational institution administration. The authors highlighted that the effective application of Agile methods can enhance interaction between administration and teaching staff. This aligns with the findings of the authors' study, which demonstrated that improved communication positively impacts both the educational process and administrative decision-making. However, the study also identified certain challenges associated with the implementation of Agile management. For instance, some educators expressed concerns regarding insufficient preparedness for change and the need for additional training. This observation is supported by S. Saleh *et al.* (2019), who emphasised the critical importance of professional development for teachers as a key factor in the successful adoption of Agile methodologies.

The SWOT analysis conducted as part of the research highlighted several strengths of Agile management, including its ability to facilitate rapid responses to change, enhance communication, and improve flexibility. However, it also identified weaknesses, such as resistance to change and a lack of training. These findings correspond with the work of P. Sarhadi *et al.* (2022), who noted that the implementation of Agile methodologies can be hindered by existing governance structures. The study conducted by G. Rivera & J. Zuleta (2023) highlighted the significant role of Agile methodologies in the management of higher education programmes. The findings supported the observation that the implementation of Agile can enhance the quality of educational projects and management strategies, ultimately leading to increased student satisfaction. However, it is crucial to consider the diversity of educational

contexts. J. Tapia *et al.* (2023) pointed out that the effectiveness of Agile implementation may vary depending on the specific characteristics of an educational institution. This underscores the importance of adopting an individualised approach to the adaptation of Agile methodologies across different universities.

The findings of the current study are also consistent with the conclusions of A. Sherstobitova *et al.* (2020), who examined the integration of Agile methodologies with Project Management Body of Knowledge (PMBOK) standards in educational institutions. The research suggests that the adaptation of modern management methods can significantly enhance the quality of educational activities in universities. Additionally, the results align with the work of D. Tamayo Avila *et al.* (2022), who introduced the ASEST+ concept to improve teamwork in Agile education. This further reinforces the idea that collaboration and teamwork are essential components for the successful implementation of Agile management in higher education institutions. The study conducted by T. Zhu & O. Ryzhkov (2021) also emphasised the importance of Agile methodologies in the planning of educational programmes. The scientists' findings aligned with the results of this study, demonstrating that Agile approaches in management can significantly enhance curriculum development and improve interaction among participants in the educational process. Similarly, O. Vitchenko & S. Shcherbakov (2022) addressed the challenges associated with educational and methodological activities in the context of digitalisation in education. This is a crucial consideration, as the findings suggest that Agile management can serve as an effective solution to these challenges by fostering a more adaptive and flexible educational environment.

As an innovative approach in higher education, Agile management has demonstrated its value by enabling rapid adaptation to change, increasing flexibility, and enhancing communication between stakeholders in the educational process. An analysis of the study results indicates that the use of Agile methodologies allows for a more responsive approach to student and teacher needs, strengthens communication across different levels of administration, and improves project management efficiency. These findings are consistent with the research of E. Boti *et al.* (2021), who highlighted the positive impact of Agile on skill development and collaboration within educational projects. Furthermore, this study found that Agile enhances the involvement of staff in decision-making processes within educational institutions. This finding aligns with the work of A. Cojocar *et al.* (2022), who reported improvements in educational organisations due to increased flexibility in management. However, the results also indicate that the successful application of Agile methodologies requires careful planning and adaptation to the specific characteristics of the educational sector, which can be a complex process. This challenge corresponds with the observations of D. Francis (2022), who noted that the implementation of Agile in universities requires sufficient time for adaptation and a shift in management culture.

One of the defining characteristics of Agile is its emphasis on people and teamwork, which is particularly significant in an educational environment where the interaction between teachers, students, and administration plays a crucial role in achieving successful outcomes. It is also important to note that the findings of this study revealed certain differences from those of V. Duarte *et al.* (2021), who examined the application of Agile in the context of engineering education and concluded that this approach is most effective in technical disciplines. In contrast, the results of the present study indicate that Agile can be successfully adapted to broader educational contexts, including the humanities. Furthermore, the study by L. Dong (2023) highlighted the importance of sustainability in Agile education, suggesting new avenues for further research, particularly in relation to integrating sustainable approaches into the educational process. This perspective aligns with the observed benefits of Agile in increasing student engagement and motivation by providing greater opportunities for independent decision-making and participation in management processes. As noted by M. Levy *et al.* (2021), such an innovative approach allows for the adaptation of education to the individual needs of each student, thereby enhancing learning effectiveness through the personalisation of teaching methodologies.

Overall, the findings of this study suggest that the implementation of Agile management in higher education has significant potential to enhance the educational process and increase student satisfaction. However, further research is needed to identify the most effective practices for implementing Agile across different educational contexts. By integrating the results of this study with the conclusions of other researchers, it can be argued that Agile management is not only an innovative approach in higher education but also a crucial tool for adapting to the challenges of modern education. For Agile to be successfully implemented, it is essential to consider the unique characteristics of each institution, the needs of its stakeholders, and the specific dynamics of the educational process. Future research should therefore focus on developing practical recommendations for universities aiming to integrate Agile methodologies, as well as exploring the impact of cultural factors on the success of their implementation.

CONCLUSIONS

The study found that the implementation of Agile management in the administration of educational processes at the university had a significant positive impact on both the quality of education and management practices. The research involved a comparative analysis of two groups: an experimental group, which applied Agile methods, and a control group, which adhered to a traditional management system. The findings indicate that participants in the experimental group reported enhanced communication, greater student engagement, and more efficient task completion. The use of Agile methods, such as Scrum and Kanban, facilitated the rapid adjustment of tasks and

encouraged active participation in decision-making. This increased flexibility in the educational process and enabled a prompt response to changes in the learning environment. Furthermore, students in the experimental group noted a rise in motivation and were more actively engaged in discussions on educational materials during regular meetings.

Teachers observed a reduction in bureaucratic obstacles and improved communication with students, which positively influenced the overall learning environment. Despite these promising results, the study has certain limitations. The duration of the experiment was restricted to one semester, which does not allow for a comprehensive assessment of the long-term effects of Agile management implementation. Additionally, the sample size may not have been sufficient to generalise the findings across the entire university. Moreover, as the study focused on a single educational institution, the ability to compare results with other universities that have adopted Agile methodologies remains limited. The findings of this study suggest that Agile management can serve as an effective tool for modernising the educational process. However, to enhance the reliability and applicability of these results, it is recommended that larger-scale studies be conducted across multiple universities to identify general trends and potential challenges in adapting Agile to diverse educational contexts. An important direction for further research is the examination of the impact of Agile management on the quality of education from the perspective of students enrolled in different modes of study, including full-time, part-time, and distance learning.

While this study demonstrates the feasibility of implementing Agile in educational processes, a comprehensive analysis of its effectiveness requires additional research that considers the diversity of educational environments and students' needs. Future research could focus on comparing different Agile methodologies within higher education, as well as analysing the tools and technologies used to support Agile management. It is essential to investigate how various Agile implementation strategies influence different aspects of the educational process, particularly in terms of learning quality, student satisfaction, and academic performance. As the education system continues to evolve, research into Agile management can play a significant role in shaping new approaches to teaching and the administration of educational processes. The successful adoption of Agile methodologies could serve as a model for other educational institutions seeking to modernise management practices, adapt to contemporary requirements, and enhance competitiveness in the educational services market. Therefore, it is crucial to continue exploring the opportunities and challenges associated with Agile management and to identify effective strategies for its implementation across different educational contexts.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Abang, K.I.R., Gatmaitan, D.L.V., Manalo, F., Torcelino, M.R., Rodriguez, R.L., & Serrano, E.A. (2022). CCT online request of students credentials: A document management system for private HIEs in the philippines. In *2022 2nd international conference in information and computing research (iCORE)* (pp. 25-29). Cebu: IEEE. [doi: 10.1109/iCORE58172.2022.00024](https://doi.org/10.1109/iCORE58172.2022.00024).
- [2] Boti, E., Damasiotis, V., & Fitsilis, P. (2021). Skills development through Agile capstone projects. In G. Succi, P. Ciancarini & A. Kruglov (Eds.), *Frontiers in software engineering* (pp. 97-112). Innopolis: Springer. [doi: 10.1007/978-3-030-93135-3_7](https://doi.org/10.1007/978-3-030-93135-3_7).
- [3] Cojocar, A., Cojocar, M., Jianu, A., Bucea-Manea-Țoniș, R., Păun, D., & Ivan, P. (2022). The impact of Agile management and technology in teaching and practicing physical education and sports. *Sustainability*, 14(3), article number 1237. [doi: 10.3390/su14031237](https://doi.org/10.3390/su14031237).
- [4] Dong, L. (2023). Strengthening sustainability in Agile education: Using client-sponsored projects to cultivate Agile talents. *Sustainability*, 15(11), article number 8598. [doi: 10.3390/su15118598](https://doi.org/10.3390/su15118598).
- [5] Duarte, V., Vidal, C., Contreras, S., & Cleveland-Slimming, M. (2021). Agile methodology and service-learning: Experience in engineering in information and management control students. In *2021 40th international conference of the chilean computer science society (SCCC)*. Chile: IEEE. [doi: 10.1109/SCCC54552.2021.9650424](https://doi.org/10.1109/SCCC54552.2021.9650424).
- [6] Francis, D. (2022). The Agile paradigm and organisation development in higher educational institutions. In *8th international conference on higher education advances (HEAd'22)* (pp. 833-840). Valencia: Valencia Polytechnic University. [doi: 10.4995/HEAd22.2022.14658](https://doi.org/10.4995/HEAd22.2022.14658).
- [7] Fernandez, M.G., Godoy Guglielmone, M.V., Mariño, S.I., & Barrios, W.G. (2020). Agility in instructional design. Strengthening of digital skills in incoming students at FaCENA-UNNE. In P. Pesado & M. Arroyo (Eds.), *Communications in computer and information science* (pp. 124-136). Cham: Springer. [doi: 10.1007/978-3-030-48325-8_9](https://doi.org/10.1007/978-3-030-48325-8_9).
- [8] Ivetic, P., & Ilic, J. (2020). Reinventing universities: Agile project management in higher education. *European Project Management Journal*, 10(1), 64-68. [doi: 10.18485/epmj.2020.10.1.7](https://doi.org/10.18485/epmj.2020.10.1.7).
- [9] Jamal Al-Lail, H.R., & Mohamed, E. (2019). Innovation in the quality life cycle of higher education institutions: The case of Effat University. In *Management and administration of higher education institutions at times of change* (pp. 99-116). Leeds: Emerald Publishing Limited. [doi: 10.1108/978-1-78973-627-420191007](https://doi.org/10.1108/978-1-78973-627-420191007).
- [10] Jardim, R., Santos, L., Rodrigues, H., França, J., & Vivacqua, A. (2023). Measurement of collaboration with Agile practices in a virtual learning environment. *Procedia Computer Science*, 221, 33-40. [doi: 10.1016/j.procs.2023.07.005](https://doi.org/10.1016/j.procs.2023.07.005).
- [11] Kate, V., Bhalerao, S., & Sharma, V. (2023). Exploring Agile methodologies in educational software development – a comparative analysis and project management insights. In *2023 IEEE international conference on ICT in business industry & government (ICTBIG)*. Indore: IEEE. [doi: 10.1109/ICTBIG59752.2023.10456214](https://doi.org/10.1109/ICTBIG59752.2023.10456214).
- [12] Lalic, B., Ciric, D., Savkovic, M., Rakic, S., & Marjanovic, U. (2021). Exploring the use of game-based learning in Agile project management education. In *2021 19th international conference on emerging elearning technologies and applications (ICETA)* (pp. 218-224). Košice: IEEE. [doi: 10.1109/ICETA54173.2021.9726599](https://doi.org/10.1109/ICETA54173.2021.9726599).
- [13] Levy, M., Hadar, I., & Aviv, I. (2021). Agile-based education for teaching an Agile requirements engineering methodology for knowledge management. *Sustainability*, 13(5), article number 2853. [doi: 10.3390/su13052853](https://doi.org/10.3390/su13052853).
- [14] Lopez-Alcarria, A., Olivares-Vicente, A., & Poza-Vilches, F. (2019). A systematic review of the use of Agile methodologies in education to foster sustainability competencies. *Sustainability*, 11(10), article number 2915. [doi: 10.3390/su11102915](https://doi.org/10.3390/su11102915).
- [15] Miličević, J., Filipović, F., Jezdović, I., Naumović, T., & Radenković, M. (2019). Scrum Agile framework in e-business project management: An approach to teaching scrum. *European Project Management Journal*, 9(1), 52-60. [doi: 10.18485/epmj.2019.9.1.7](https://doi.org/10.18485/epmj.2019.9.1.7).
- [16] Orsdemir, A., Tilki, G., & Altinay, F. (2019). Evaluation by teachers of “Use of influence in Agile management” by school administration. *International Journal of Disability, Development and Education*, 66(6), 577-589. [doi: 10.1080/1034912X.2019.1634249](https://doi.org/10.1080/1034912X.2019.1634249).
- [17] Rivera, G., & Zuleta, J. (2023). Management of software projects in degree projects using an Agile methodology. In *2023 18th Iberian conference on information systems and technologies (CISTI)*. Aveiro: IEEE. [doi: 10.23919/CISTI58278.2023.10212009](https://doi.org/10.23919/CISTI58278.2023.10212009).
- [18] Saleh, S., Richard Philip, S., & Shemu, N. (2019). Agile understanding analysis and comparison through students evaluation. In *2019 international conference on computational intelligence and knowledge economy (ICCIKE)* (pp. 707-712). Dubai: IEEE. [doi: 10.1109/ICCIKE47802.2019.9004271](https://doi.org/10.1109/ICCIKE47802.2019.9004271).
- [19] Sarhadi, P., Naeem, W., Fraser, K., & Wilson, D. (2022). On the application of Agile project management techniques, V-model and recent software tools in postgraduate theses supervision. *IFAC-PapersOnLine*, 55(17), 109-114. [doi: 10.1016/j.ifacol.2022.09.233](https://doi.org/10.1016/j.ifacol.2022.09.233).

- [20] Sherstobitova, A., Glukhova, L., Khozova, E., & Krayneva, R. (2020). Integration of Agile methodology and PMBOK standards for educational activities at higher school. In V. Uskov, R. Howlett & L. Jain, (Eds.), *Smart education and e-learning 2020. Smart innovation, systems and technologies* (pp. 339-349). Singapore: Springer. [doi: 10.1007/978-981-15-5584-8_29](https://doi.org/10.1007/978-981-15-5584-8_29).
- [21] Tamayo Avila, D., Van Petegem, W., & Snoeck, M. (2022). Improving teamwork in Agile software engineering education: The ASEST+ framework. *IEEE Transactions on Education*, 65(1), 18-29. [doi: 10.1109/TE.2021.3084095](https://doi.org/10.1109/TE.2021.3084095).
- [22] Tapia, J., Avilés, F., García, J., Cuesta, D., & Flores, C. (2023). Business process management in the digital transformation of higher education institutions. In Á. Rocha, C. Ferrás & W. Ibarra (Eds.), *Information technology and systems. Lecture notes in networks and systems* (pp. 561-571). Cham: Springer. [doi: 10.1007/978-3-031-33258-6_51](https://doi.org/10.1007/978-3-031-33258-6_51).
- [23] Vitchenko, O., & Shcherbakov, S. (2022). Problems and challenges of educational and methodological activities in higher education in the context of digitalization of education. In A. Beskopylny & M. Shamtsyan (Eds.), *XIV international scientific conference "Interagromash 2021". Lecture notes in networks and systems* (pp. 823-832). Cham: Springer. [doi: 10.1007/978-3-030-80946-1_75](https://doi.org/10.1007/978-3-030-80946-1_75).
- [24] Zhu, T., & Ryzhkov, O. (2021). Application of Agile methodology in planning a joint educational program. In *2021 IEEE international conference on smart information systems and technologies (SIST)*. Astana: IEEE. [doi: 10.1109/SIST50301.2021.9465917](https://doi.org/10.1109/SIST50301.2021.9465917).

Віталій Коцур

Доктор історичних наук, кандидат політичних наук, професор
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0001-6647-7678>

Алла Зленко

Кандидат історичних наук, професор
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0002-5586-3984>

Яна Пшиченко

Аспірант
Вроцлавський економічний університет
53-345, вул. Командорська, 118/120, м. Вроцлав, Польща
Викладач
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0009-0001-6052-7897>

Agile-менеджмент як інструмент трансформації освітнього управління

Анотація. Метою даного дослідження було вивчення можливостей Agile-менеджменту як інструменту для трансформації освітнього управління. У дослідженні проаналізовано вплив Agile-підходів на організацію навчального процесу та управлінські процеси у закладах вищої освіти. Методологія дослідження включала порівняльний аналіз, що дозволив оцінити ефективність впровадження Agile-менеджменту в освітній процес, а також SWOT-аналіз, який виявив сильні та слабкі сторони, можливості та загрози, пов'язані з цим підходом. Основні результати свідчать про те, що адаптація Agile-менеджменту сприяє підвищенню гнучкості в управлінні освітніми проектами, зменшує час на ухвалення рішень і підвищує ефективність комунікації між усіма учасниками освітнього процесу. Впровадження таких підходів дозволило навчальним закладам швидше реагувати на зміни в навчальних програмах, адаптуватися до нових технологій та потреб ринку праці. Дослідження також виявило, що використання Agile-методів позитивно вплинуло на мотивацію студентів і викладачів, сприяючи формуванню більш відкритого і колабораційного навчального середовища. Студенти відзначали підвищену активність у навчанні, а викладачі – поліпшення взаємодії з учнями, що призвело до зростання задоволеності від освітнього процесу. Отримані результати вказують на значний потенціал Agile-менеджменту для підвищення ефективності управління закладами вищої освіти. Вдосконалення цих практик, а також їх адаптація до специфічних умов навчальних закладів забезпечить стійкий розвиток освіти в майбутньому. Дане дослідження підтверджує важливість розробки нових стратегій управління, що покращить організацію навчального процесу, підвищить задоволеність студентів та сприятиме інноваційному розвитку освітніх установ.

Ключові слова: лідерство в освітньому середовищі; цифрова трансформація університетів; розвиток академічного потенціалу; управління інноваційними проектами; система контролю якості освіти

**Larysa Shevchuk***

Doctor of Pedagogical Sciences, Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoho Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0002-8405-1168>

Andrii Hryhorenko

Postgraduate Student
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoho Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0001-6856-9840>

Oksana Shevchuk

Postgraduate Student
Mykhailo Dragomanov Ukrainian State University
02000, 9 Pyrohova Str., Kyiv, Ukraine
<https://orcid.org/0009-0003-1901-690X>

Simulation training in higher education: Assessment of perceived effectiveness and students' readiness to develop professional competencies

Abstract. The relevance of the topic is due to the need to introduce simulation technologies into the professional training of future specialists in the context of digitalisation of education and increased requirements for practical competence, which is confirmed by empirical data: 94.22% of surveyed students reported that the use of simulation complexes enhances the effectiveness of learning, and 97.77% positively evaluated the learning process in electronic simulation environments. The aim of the study was to identify the factors that influenced students' readiness to use simulation software packages within the electronic educational environment of higher education institutions. The empirical base (methods) was formed on the results of an online survey in which 450 students from Ukrainian universities participated on a voluntary basis. The study analysed students' attitudes toward simulation technologies, their learning preferences, and their level of readiness to use software simulation systems in the learning process. The results showed that e-learning using simulation systems was effective under the following conditions: realistic training scenarios; the possibility of repeatedly practicing practical actions without the risk of errors in a real environment; adaptation of the educational process to the level of student preparation; increased motivation due to interactivity and gamification. At the same time, it was found that the conclusions regarding the development of professional competencies were based primarily on students' self-evaluations, and therefore required further empirical verification using objective diagnostic tools. The practical significance of the results consisted in the possibility of using them to modernise educational programs and to improve the electronic educational environment of higher education institutions

Keywords: software modelling complexes; learning process; adaptive educational strategies; electronic educational environment

INTRODUCTION

The issue of latent knowledge retention has become increasingly significant, as a substantial proportion of acquired theoretical information is not transformed into practical application and, therefore, remains unused. This

Suggested Citation:

Shevchuk, L., Hryhorenko, A., & Shevchuk, O. (2026). Simulation training in higher education: Assessment of perceived effectiveness and students' readiness to develop professional competencies. *Scientia et Societatis*, 5(1), 20-29. doi: 10.69587/ss/1.2026.20.

*Corresponding author (sheld65l@gmail.com)



leads to the gradual loss of educational outcomes over time. The contemporary stage of higher education development is characterised by the intensification of digital transformation processes, the expansion of interactive learning formats, and the transition to competence-based training models. Under such conditions, the educational environment requires tools that ensure active engagement, continuity of learning, and the possibility of safe experimentation with professional tasks. Simulation-based digital environments provide conditions for practising functional actions in close-to-real situations, supporting gradual skill development, self-regulation, and adaptive learning trajectories.

An analysis of scientific sources showed that simulation tools are one of the most effectively described types of interactive technologies in the literature, widely used in virtual educational environments. In the context of professional training for future vocational teachers, simulations provide the opportunity to recreate professionally oriented situations, perform actions in safe conditions, and model operations that require special equipment or access to production resources in the real educational process. I. Kos (2024) believed that simulation complexes allow complex processes to be reproduced in a visual form, model parameters to be varied, the consequences of decisions made to be analysed, and actions to be corrected in real time. The use of such tools supports active interaction between students and educational material, promotes the development of operational thinking, professional skills, and digital competence. D. Antoniuk *et al.* (2023) emphasised that the relevance of simulation technologies increased significantly during the COVID-19 pandemic and wartime conditions, when flexible and immersive learning formats became essential.

J. Dron (2022) noted that the advancement of computer technologies and digital communication networks has facilitated the spread of simulation software and business games across higher education. V. Ahuja (2024) emphasised the central role of modelling in enhancing the learning experience. The scientist argued that the impact of simulation-based learning on business education is particularly significant, encompassing research on business simulation games, computer-based simulations, and their influence on skills development, learning processes, and overall performance. A. Binsztok *et al.* (2022) described simulation modelling as an experimental method that enables the analysis of real systems while avoiding risks inherent in real-world processes. Research by I. Buil *et al.* (2019) and O. Chernikova *et al.* (2020) demonstrated the significance of simulation environments in developing collaborative problem-solving and team interaction. T. Peters, & P. Stamp (2021) and V. Chernenko *et al.* (2021) additionally noted the improvement of communication and organisational competences gained through participation in simulated professional situations.

The primary aim of the study was to analyse the effectiveness of simulation-based learning in higher education and its role in the development of students' professional

competencies. In accordance with this aim, the research examined students' attitudes toward the use of simulation software in virtual learning environments, taking into consideration both its advantages and the challenges associated with its implementation. Furthermore, attention was given to the organisation of individual and group learning formats involving simulation technologies, with an emphasis on their pedagogical potential. The study also investigated the degree of students' readiness to apply simulation-based learning in their future professional activities, focusing on the formation and manifestation of relevant competencies.

MATERIALS AND METHODS

The study was based on a mixed-methods approach, combining qualitative and quantitative methods to assess the effectiveness of simulation-based learning in higher education. At the first stage, a theoretical analysis of scientific sources and previous research was carried out to determine the main principles of integrating simulation software into educational practice. The works of (Chernikova, *et al.*, 2020; Sakun *et al.*, 2020; Chernenko *et al.*, 2021) were reviewed to establish the conceptual framework of the study. The second stage involved empirical research, which included a survey conducted among 450 respondents, comprising bachelor's, master's, and postgraduate students from Mykhailo Drahomanov Ukrainian State University, Hryhorii Skovoroda University in Pereiaslav, and International European University. The survey was carried out between October and December 2024 in an online format using the platforms Google Forms and Microsoft Forms. The data collection was conducted through anonymous questionnaire-based surveying, without requiring respondents to provide personal identification details. The purpose of the survey was to determine students' attitudes toward simulation-based learning, assess their level of motivation, and evaluate the perceived effectiveness of simulation tools in a blended learning environment.

The study incorporated expert evaluations of students' readiness to integrate simulation-based learning into their future teaching practices. The experts included university professors with specialist knowledge in the fields of pedagogical innovations, digital education and instructional technologies. The evaluations focused on the following criteria:

- 1) theoretical preparedness – understanding the principles and applications of simulation software;
- 2) practical competence – ability to operate, implement and integrate simulation tools into the educational process;
- 3) digital competence – familiarity with digital learning environments and adaptability to simulation technology-enhanced teaching.

Statistical analysis of the collected data was carried out using both descriptive and inferential methods. In particular, Pearson's correlation coefficient (for normally distributed variables) and Spearman's rank correlation coefficient (for non-parametric data) were applied to determine the relationships between students' motivation,

their perceived effectiveness of simulation software, and their readiness to apply these tools in professional contexts. Correlation coefficients were calculated between the dependent variable – students' willingness to integrate simulation tools into professional practice – and a number of independent variables, such as: level of digital competence; field of study; year of study; previous experience with modelling/simulation software. The correlation coefficient was selected depending on the nature of the distribution of each variable: (1) for normal distribution, Pearson's correlation coefficient (r) was used, which allows assessing the linear dependence between variables; (2) for deviations from normality or in the case of ordinal variables, Spearman's correlation coefficient (ρ) was used, which allows monotonic dependencies to be measured.

The computation is based on the regression equation presented in Formula (1), which includes the constant term and four independent variables-digital competence, previous modelling experience, field of study, and year of study-each weighted by its corresponding regression coefficient

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon, \quad (1)$$

where Y – students' readiness to integrate simulation tools; β_0 – constant; β_1 – regression coefficients; x_1 – level of digital competence; x_2 – field of study; x_3 – year of study; x_4 – previous experience with simulation software; ε – model error. This formula is used to model the relationship between multiple explanatory variables and students' readiness to use simulation tools, allowing for an assessment of the individual contribution of each predictor while controlling for the effects of the others. On this basis, a multiple linear regression model was constructed to estimate the combined influence of digital competence, prior experience, and academic characteristics on readiness and to evaluate the predictive capacity of the proposed model. The study adhered to ethical research standards, ensuring anonymity and voluntary participation (Ethical Code of a Scientist of Ukraine, 2009).

RESULTS AND DISCUSSION

The use of simulation modelling in educational practice

A review of international and domestic experience in the use of software simulation complexes in an educational context reveals a clear and consistent trend: there is growing scientific interest in the integration of gaming technologies and simulations at the level of higher education. The introduction of new teaching technologies, starting with game-based learning integrated into lectures and practical classes for training management specialists, as well as the rapid development of information and communication technologies (ICT), according to A. Negahban (2024), required the transformation of higher education and greater use of business computer games as innovative teaching technologies. In addition, the European Social Simulation Association (n.d.) holds annual conferences, seminars and congresses, and publishes the electronic journal JASSS.

The work of I. Buil *et al.* (2019) demonstrated that the use of games and simulations has a variety of positive effects in numerous applications, including improving student performance, interaction between learners in groups, and motivation to learn. The distinctive feature of simulation modelling as a research method is that it enables the conduct of computer experiments, whereby the researcher can "fix" the desired variables, influencing and changing only some of them. Furthermore, simulation modelling fosters the development of students' genuine interest in their future profession. The use of imitation modelling in the context of professional situations represents an effective and methodologically sound technique that is highly relevant in the present day. Situational modelling (business games) is a method based on recreating certain situations in special laboratory conditions in order to solve complex problems or for educational purposes that may arise in real systems. The concept of "situation" is quite multifaceted and is defined differently depending on the area of its use. N. considers a situation as a system of conditions external to the subject that motivate and mediate its activity (Chepelieva *et al.*, 2025).

According to S. Korolyuk & N. Kononets (2022), the analysis of a specific situation is an in-depth and detailed study of real or artificial circumstances, carried out with the aim of identifying characteristic properties. The simulation method involves immersing individuals in fictitious conditions that mimic real-life scenarios for the purpose of training or assessment. According to S. Korolyuk & N. Kononets (2022), high-quality simulation consists of three main structural components: a carefully designed working model of the professional environment, which offers a wide range of options for behaviour and interaction with other people; a modelling process designed to promote the development of intuition and the search for alternative, non-standard solutions to problems; the presence of a mentor who uses a "skifolding" strategy, characterised by the gradual withdrawal of assistance from the teacher as the student progresses in their independent work. G. Kravchuk & T. Shevchuk (2019) believed that this method should be used in training future managers, as it develops applicants' analytical thinking and systematic approach to problem solving, allows them to distinguish between correct and incorrect management decisions, select (and formulate) criteria for finding the optimal solution, teaches how to establish business and professional contacts, make collective decisions and resolve conflicts. The educational environment, when active learning methods are used, in particular software simulation complexes, where they reflect the essence of the future profession and shape the professional qualities and competencies of specialists, is a kind of testing ground where students can practise their professional skills in conditions close to real life. A deep and broad analysis of the actions of student teachers, which is carried out during the summing up, reduces the likelihood of repeating mistakes in real professional activity. This helps to reduce the time it takes for a young specialist to adapt to the full performance of their professional activities.

This ability determines the expediency and necessity of using software modelling complexes in training, in the process of which the student must perform actions similar to those that may occur in their professional activities. L. Uryvskiy *et al.* (2022) believed that modern computer modelling is a means of: communication between people (exchange of information, computer models and programmes), understanding and cognition of phenomena in the surrounding world (computer models of the solar system, atoms, etc.), training and practice (simulators), optimisation (selection of parameters). Since its inception, computer modelling has penetrated many fields of science, among which economics, ecology and the military sphere traditionally occupy the first place (in some models, they are closely intertwined). According to O. Prigunov & Y. Yavorska (2023), most modern business simulators have a variety of tasks, which makes the learning process more universal. However, the developers of these games and researchers focus most of their attention on the methodological support of certain disciplines in the economic fields of research, in particular the specialities of accounting and auditing, economic theory, finance and credit, business economics, management, etc.

The use of a computer-modelled learning system gives students the opportunity to experiment with new models of behaviour in a competitive environment, confront their fears, master new approaches to problem solving, and develop strategies that can be applied in real professional contexts. According to V. Senadheera *et al.* (2024), the basis of the modelling system should be a model of the object's activity, developed on the basis of analytics of the current situation in the relevant industry. In the process of game-based learning, participants will have to perform actions to solve management tasks in various aspects of the object's activities (development and implementation of strategies, construction of development programmes, infrastructure management, etc.). The mathematical model should demonstrate the consequences of the decisions made by the participants. A. Haleem *et al.* (2022) believed that this approach to professional training is more realistic than a set of separate questions on the topic under study, which are considered without any connection to reality. Technological advances in education have made life easier for students. Instead of pen and paper, students today use a variety of software and tools to create presentations and projects. When using computer modelling in the learning process, real professional fragments of activity and interpersonal relationships of specialists engaged in it are reproduced, and students are provided with the outlines and contexts of their future professional activity.

L. Sakun *et al.* (2020) believed that these tools promote the integration of theoretical knowledge with practical application, improving the overall learning process and ensuring the development of the necessary professional competencies. The use of software modelling complexes in the training of vocational education students involves the

conceptualisation of a system that distinguishes between group, individual and individual-group lessons, in combination with the sphere of independent learning (work) of students. This system is based on identifying the prevailing cycles of educational activity management, as well as determining the degree of influence of electronic learning tools on the effectiveness of learning. Group classes using software modelling complexes can take place without feedback or with partial feedback. These are lecture-style classes, where the teacher unilaterally conveys information and makes adjustments to the content and form of its presentation (feedback) based solely on visual or associative factors. Practical and laboratory classes are conducted in groups with more pronounced feedback when using software modelling complexes. The process of individual student classes using software modelling complexes takes place under the supervision and participation of the teacher with feedback. These can be classes with a student individually or as part of a group, when they fall into the category of individual and group classes. The process of independent learning using software modelling complexes should be viewed as a process of self-organisation (self-governance) without the participation of a teacher. The actual learning process is mixed, in which the above types of processes occur. O. Chernikova *et al.* (2020) believed that electronic learning tools should integrate the entire system of basic principles, methods, content, and the above-mentioned organisational and technological features of the learning process.

Assessment of the effectiveness and students' attitudes towards simulation tools in education

This study focuses on industry-specific software developed for modelling technical processes and production situations. This software is used in the training of future teachers at vocational and technical educational institutions specialising in engineering and technology. These include programmes such as FluidSIM, Factory I/O, Tinkercad, AutoSIM and Simulink, which facilitate the modelling of pneumatic, electrical, electronic and automated systems. The results of a comparative analysis of specialised software for training (SST) future teachers in terms of competence, adaptability and interactivity are presented in Table 1. The initial attempt to assess the effectiveness of the implementation of the SPE was based on a survey of students and teachers to find out the frequency of use of simulation environments, the types of software used and subjective assessments of its impact on learning. In the first stage of the study, respondents were surveyed about their attitudes towards the use of simulation tools in the electronic educational environment (Table 2), which made it possible to ascertain the level of awareness of students about the relevant tools, determine their readiness to work with such technologies, and identify key expectations and barriers associated with their use.

Table 1. Comparative characteristics of specialised software for use in vocational and pedagogical training

SST	Developed professional competencies	Possibilities of adaptation to the pedagogical context	Level of interactivity/complexity
FluidSIM	- Technical design - Systems thinking - Analysing the logic and control of pneumatic and hydraulic systems	- Ability to model real automation schemes - Visualisation is available to explain the logic of operation - Suitable for developing STEM competences	High (medium level of difficulty)
Factory I/O	- Spatial imagination - Understanding of production processes - Interaction with PLCs	- Virtual factories allow you to explain industrial automation - Used in conjunction with controllers (Siemens, Allen-Bradley) - Ideal for professional training in the field of mechatronics	High (high level of complexity)
Tinkercad	- Electronics basics - Prototyping - Visual programming	- Designed for beginner and intermediate levels - Ideal for teaching the basics of digital electronics and Arduino - Can be used in schools and VET centres	Medium (low-medium level of difficulty)
AutoSIM	- Modelling of automated systems - PLC programming - Testing of technical scenarios	- Creation of models for training in industrial automation - Availability of simulation and test modes - Suitable for creating professional cases	High (medium-high level of difficulty)
Simulink	- Mathematical modelling - Cyber-physical systems - Management of technical objects	- Basic MATLAB training required - Great opportunities for engineering education and research - Can be used in the training of technical teachers	Very high (high level of complexity)

Source: developed by the authors

Table 2. Survey results on students' attitudes towards the use of simulation tools in a virtual learning environment

No.	Respondent statement	Share of positive responses, %	Interpretation of results
1	The use of simulation complexes in virtual learning offers clear advantages	94.22%	Indicates a high level of general support for simulation-based learning
2	Positive attitude towards e-learning	96.6%	Confirms the acceptability of digital learning formats
3	Effectiveness of self-directed learning using simulation complexes	98%	Demonstrates that simulations promote student autonomy
4	Necessity of considering students' individual characteristics when applying simulation complexes	98.8%	Highlights the requirement for personalisation within simulation-based learning
5	Importance of accounting for psychophysiological characteristics in simulation-based learning	97.55%	Underlines the significance of adaptive learning systems
6	Simulation complexes should model a professionally oriented learning environment	99.11%	Confirms the need for professionally relevant simulation scenarios
7	Positive attitude towards the use of mobile technologies	97.11%	Indicates readiness for mobile-supported learning formats
8	Overall effectiveness of learning in electronic simulation environments	97.77%	Reinforces the relevance and demand for simulation-enhanced learning

Source: developed by the authors

It turned out that 94.22% of the respondents believe that the use of simulation complexes in virtual environment learning, as well as the implementation of their adaptive capabilities in professional training, brings undoubted benefits (1). A positive attitude towards e-learning was expressed by 96.6% of students (2). In the opinion of 98% of students, the organization of the process of independent learning during individual and individual-group classes using simulation complexes is effective (3). The overwhelming majority of students, namely 98.8%, believe that the necessary implementation of teaching professional cycle disciplines by means of simulation complexes depends on the individual characteristics of students (4). For 97.55% of respondents, it is mandatory to take into account the psychophysiological characteristics of students during training in a simulation environment (5). 99.11% of

the respondents believe that simulation complexes should be built to simulate a professionally oriented learning environment (6). 97.11% of respondents show a positive attitude towards the use of mobile technologies in the educational process (7). In general, 97.77% of respondents consider the learning process in electronic simulation environments to be effective, which confirms the relevance of the topic of the chosen study (8). The results of the survey are presented in Figure 1. At the same time, these results not only demonstrate general support for simulation training, but also indicate the need for a more in-depth analysis of the factors that shape students' willingness to integrate simulation tools into their professional activities. With this in mind, an additional analytical stage was introduced to ensure consistency between the stated research objective and its empirical results.

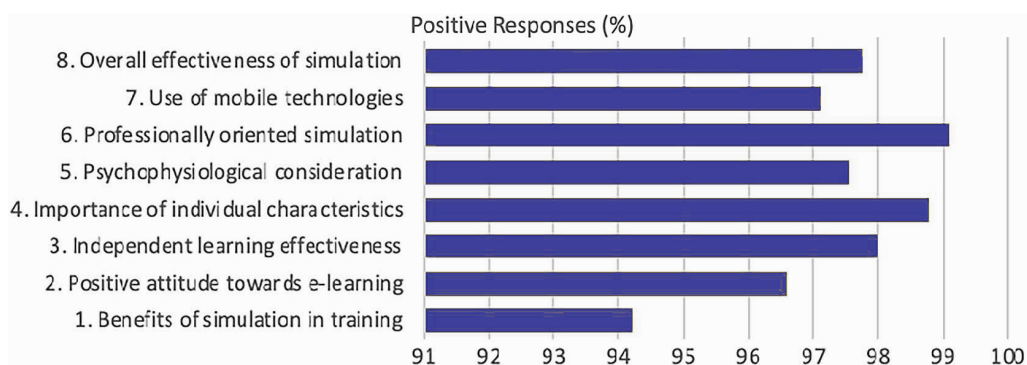


Figure 1. Results of the survey of respondents' attitudes towards the use of simulation tools in the electronic educational environment

Source: developed by the authors

Correlation and regression analysis of factors influencing students:

Readiness to use simulation tools

To clarify the factors influencing students' readiness to integrate simulation tools into their professional activities, a correlation analysis was performed, followed by multiple regression modelling. This analytical procedure made it possible to identify not only the nature and strength of the relationships between variables, but also to assess the contribution of each factor to the overall predictive model. The results of the correlation analysis showed: (1) a high positive correlation between the level of digital competence and

readiness to use simulation tools ($r/p \approx 0.62-0.68$; $p < 0.01$); (2) a moderate positive correlation between previous experience with modelling programmes and willingness to use them ($r/p \approx 0.48-0.55$; $p < 0.05$); (3) a low or statistically insignificant correlation for the variables "field of study" and "year of study" ($p > 0.05$). The results of the correlation analysis demonstrated statistically significant positive associations between these variables, which were subsequently integrated into the overall interpretation of the research findings. These results indicate that students' readiness to integrate simulation learning depends most on their digital competence and experience with relevant tools (Table 3).

Table 3. Correlation and regression analysis results for factors influencing students' readiness to use simulation-based learning tools

Predictor (Independent Variable)	Correlation with Readiness (r / p)	Significance (p)	Standardised Regression Coefficient (β)	Interpretation
Digital Competence Level	$r = 0.65$	$p < 0.01$	$\beta = 0.47$	Digital competence substantially increases readiness to use simulation tools
Previous Experience with Modelling/Simulation Software	$r = 0.52$	$p < 0.05$	$\beta = 0.35$	Prior experience with simulation tools increases readiness and lowers technological barriers.
Year of Study (Bachelor/Master/Postgraduate)	$p = 0.18$	$p > 0.05$	$\beta = 0.09$	Readiness does not increase with academic progression
Field of Study (pedagogical vs. non-pedagogical specialisation)	$p = 0.14$	$p > 0.05$	$\beta = 0.12$	Readiness does not depend strongly on academic specialisation

To verify the predictive power of independent variables and determine their contribution to the variability of the dependent variable, the multiple linear regression method was used. To demonstrate the practical application of the multiple linear regression model employed in this study, a sample calculation of the predicted readiness level was

performed for a hypothetical student profile. By multiplying the value of each predictor by its estimated coefficient and summing these products together with the constant term, an estimated readiness score ($\hat{Y}$) can be obtained for an individual learner. The step-by-step calculation is summarised in Table 4 and Figure 2.

Table 4. Calculation of the predicted readiness level based on the multiple linear regression model

Parameter	Variable Value	Coefficient (β)	Product $\beta \cdot X$
Constant (β_0)	-	0.05	0.05
Digital Competence (X_1)	4	0.47	1.88
Previous Modelling Experience (X_2)	3	0.35	1.05
Field of Study (X_3)	1 (pedagogical)	0.12	0.12

Table 4. Continued

Parameter	Variable Value	Coefficient (β)	Product $\beta \cdot X$
Year of Study (X_4)	3	0.09	0.27
Σ (sum of products)	-	-	3.37

To illustrate the relative influence of each predictor in the regression model, Figure 2 presents the standardised regression coefficients (β). The diagram

enables a clear comparison of how the analysed factors relate to students' readiness to use simulation-based learning tools.

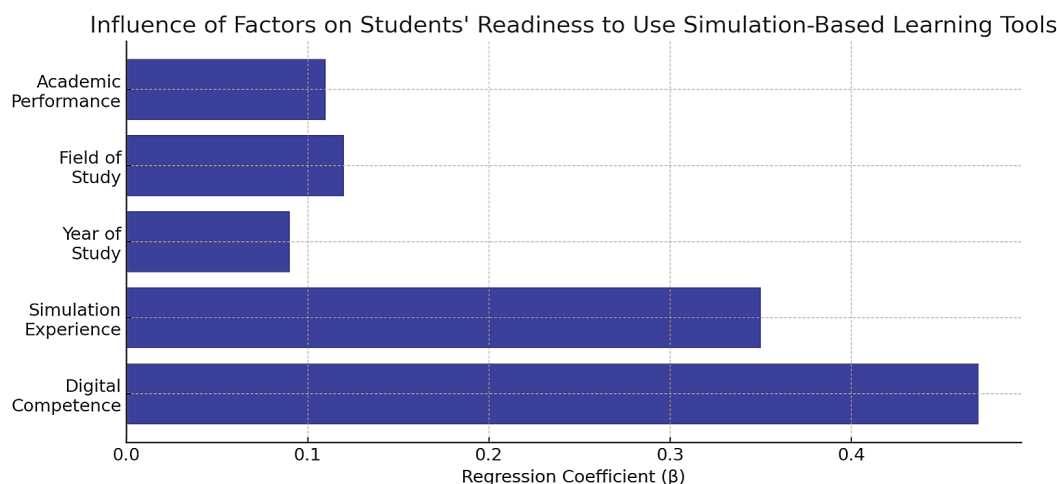


Figure 2. Influence of key factors on students' readiness to use simulation-based learning tools

Source: developed by the authors

The results obtained in this study indicate a consistently positive attitude of students toward simulation-based learning within the electronic educational environment, as well as a high evaluation of its effectiveness in blended learning formats (with over 94-99% across key indicators). Overall, these findings are aligned with current scholarly discourse, in which simulation and modelling tools are viewed as significant means of strengthening practice-oriented training, fostering learner autonomy, and developing higher-order professional competencies. The outcomes of the present research correlate with the meta-analysis conducted by A. Alharbi *et al.* (2024), who demonstrated that simulation-based learning contributes not only to increased learner motivation but also to measurable and sustained improvements in academic performance, provided the instructional sequence is methodologically structured. This underscored the pedagogical importance of a well-designed learning cycle incorporating briefing, interactive practice, debriefing, and reflective integration—an approach consistent with the conclusions drawn from the received data regarding the need for purposeful pedagogical orchestration of simulation environments. In the field of engineering education, the findings of A. Negahban (2024) revealed a systematic shift from traditional laboratory practice towards digital simulations and immersive learning environments. The author emphasised that these transformations necessitate adequate institutional support, including technical infrastructure and

lecturer preparedness. This observation corresponds with the authors' results, which identify digital competence as a key individual factor influencing students' readiness to employ simulation tools.

The research conducted by D. Meronda *et al.* (2025) on virtual laboratories confirmed that simulation environments impact not only motivational aspects of learning but also cognitive outcomes, including enhanced analytical reasoning and conceptual understanding. These conclusions are in agreement with the high levels of readiness for independent work in simulation-based environments recorded in the study. The work of D. Llanos-Ruiz *et al.* (2025) concerning VR applications in higher education highlights the capacity of immersive technologies to support the understanding of complex concepts and facilitate practical engagement. However, the authors emphasise that learning outcomes are contingent upon alignment between VR activities and intended educational objectives. This clarifies why the respondents particularly valued simulation environments that closely emulate real professional contexts. Research by M. Mohammadi *et al.* (2025) in blended learning settings demonstrates a direct relationship between the use of interactive digital tools and increased academic engagement and intrinsic motivation. The authors' findings corroborate this tendency while also suggesting that the strength of these effects may vary depending on disciplinary field and level of study. In the domain of business education A. Velez & R. Alonso (2024) showed

a shift from evaluating simulation tools based on general usefulness toward assessing their impact on specific learning outcomes, such as decision-making, entrepreneurial reasoning, and collaborative competence. The conclusions of the research align with this perspective, particularly in regard to the significance of realistic scenario-based learning for developing professional readiness. The study by M. Feijoo-Garcia *et al.* (2024) demonstrated that combining simulation-based learning with argumentative practices enhances students' capacity to integrate evidence-based reasoning in engineering design processes. This supports the assertion regarding the necessity of integrating both technical and methodological components in the design of simulation-based instruction.

Further, research by M. Kurtz *et al.* (2025) suggested that simulation environments hold considerable potential for developing social-emotional learning and collaborative capacities, which is particularly relevant for the preparation of future educators. At the same time, M. Ali (2025) noted that the effectiveness of simulations is influenced by the level of feedback and the cognitive complexity of the tasks involved. This observation indicated the relevance of applying hierarchical or structural modelling in the next stage of the authors' research to more precisely identify the predictive role of digital competence, prior experience and disciplinary background in students' readiness to implement simulation technologies. Taken together, the synthesis of empirical findings and current international research confirms that simulation-based technologies contribute to increased learning motivation, facilitate the transition from theoretical knowledge to practical application, and support the development of professional competencies. Future research should focus on deepening the modelling of readiness factors, including digital literacy, prior learning experiences, and curriculum-specific characteristics.

CONCLUSIONS

The study identified the key factors associated with students' readiness to use simulation tools in a virtual educational environment. The survey results demonstrated a consistently high level of students' positive attitudes towards simulation-based learning, as well as towards the use of mobile and digital technologies in professional

training. The correlation analysis revealed a statistically significant positive relationship between students' level of digital competence and their readiness to use simulation tools ($r = 0.65$, $p < 0.01$), indicating a moderate to strong association. A moderate positive correlation was also found between previous experience with simulation or modelling software and readiness to use such tools ($r = 0.52$, $p < 0.05$). These findings suggest that higher levels of digital competence and prior practical experience contribute to increased readiness for the integration of simulation-based learning.

The multiple regression analysis confirmed the predictive role of these factors. Digital competence showed the strongest contribution to the model ($\beta = 0.47$), followed by previous experience with simulation tools ($\beta = 0.35$). In contrast, variables related to the field of study ($\beta = 0.12$) and the year of study ($\beta = 0.09$) demonstrated weak and statistically insignificant effects, indicating that readiness does not substantially depend on academic specialisation or level of study. Overall, the explanatory power of the regression model indicates that the included predictors account for a meaningful portion of the variability in students' readiness to use simulation tools. At the same time, the presence of unexplained variance suggests the need for further research to examine additional pedagogical, organisational, and psychological factors influencing readiness for simulation-based learning. The results obtained can be used to gain a deeper understanding of which student characteristics correlate with their readiness to integrate simulation tools into the learning process. Further research could focus on expanding the model with additional variables, analysing different educational contexts, or using mixed methods to comprehensively study the factors that influence the use of simulation technologies in professional training.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

The authors have no potential conflict of interest that could influence the decision to publish this article.

REFERENCES

- [1] Ahuja, V. (2024). Simulations in business education: Unlocking experiential learning. In V. Membrive (Ed.), *Practices and implementation of gamification in higher education*. Pennsylvania: IGI Global Scientific Publishing. [doi: 10.4018/979-8-3693-0716-8.ch001](https://doi.org/10.4018/979-8-3693-0716-8.ch001).
- [2] Alharbi, A., Nurfianti, A., Mullen, R.F., McClure, J.D., & Miller, W.H. (2024). The effectiveness of simulation-based learning (SBL) on students' knowledge and skills in nursing programs: A systematic review. *BMC Medical Education*, 24, article number 1099. [doi: 10.1186/s12909-024-06080-z](https://doi.org/10.1186/s12909-024-06080-z).
- [3] Ali, M.S. (2025). A meta-analysis of simulation based learning and instructional support in higher education. *Journal of Enterprise and Business Intelligence*, 5(4), 234-247. [doi: 10.53759/5181/JEBI202505023](https://doi.org/10.53759/5181/JEBI202505023).
- [4] Antoniuk, D.S., Spiryn, O.M., & Vakalyuk, T.A. (2023). Using digital business simulators in the economic and management development of the master's degree of information technologies. *Information Technologies and Learning Tools*, 94(2), 72-86. [doi: 10.33407/itlt.v94i2.5172](https://doi.org/10.33407/itlt.v94i2.5172).

- [5] Binsztok, A., Butryn, B., Hołowińska, K., Owoc, M. L., & Sobińska, M. (2022). Business computer simulation supporting competencies: Potential areas of application and barriers. *Procedia Computer Science*, 207, 3875–3883. doi: [10.1016/j.procs.2022.09.449](https://doi.org/10.1016/j.procs.2022.09.449).
- [6] Buil, I., Catalán, S., & Martínez, E. (2019). Engagement in business simulation games: A self-system model of motivational development. *British Journal of Educational Technology*, 51(1), 297–311. doi: [10.1111/bjet.127624](https://doi.org/10.1111/bjet.127624).
- [7] Chepelieva, N.V., Smulson, M.L., & Rudytska, S.Yu. (2025). *Development of personal life competence in conditions of martial law and post-war recovery of Ukraine*. Kyiv: H.S. Kostiuk Institute of Psychology National Academy of Pedagogical Sciences of Ukraine.
- [8] Chernenko, V.P., Pochtovyuk, S.I., Vakaliuk, T.A., Shevchuk, L.D., & Slon, Y.V. (2021). Information system of economic and mathematical modelling of pricing in the residential sector of Ukraine. *Journal of Physics: Conference Series*, 1840(1), article number 012025. doi: [10.1088/1742-6596/1840/1/012025](https://doi.org/10.1088/1742-6596/1840/1/012025).
- [9] Chernikova, O., Heitzmann, N., Stadler, M., Holzberger, D., Seidel, T., & Fischer, F. (2020). Simulation-based learning in higher education: A meta-analysis. *Review of Educational Research*, 90(4), 499–541. doi: [10.3102/0034654320933544](https://doi.org/10.3102/0034654320933544).
- [10] Dron, J. (2022). Educational technology: What it is and how it works. *AI & Society*, 37, 155–166. doi: [10.1007/s00146-021-01195-z](https://doi.org/10.1007/s00146-021-01195-z).
- [11] Ethical Code of a Scientist of Ukraine. (2009). Retrieved from <https://zakon.rada.gov.ua/go/v0002550-09>.
- [12] European Social Simulation Association. (n.d.). Retrieved from <https://essa.eu.org>.
- [13] Feijoo-Garcia, M.A., Holstrom, M.S., Magana, A.J., & Newell, B.A. (2024). Simulation-based learning and argumentation to promote informed design decision-making processes within a first-year engineering technology course. *Sustainability*, 16(7), article number 2633. doi: [10.3390/su16072633](https://doi.org/10.3390/su16072633).
- [14] Haleem, A., Javaid, M., Qadri, M.A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, 3, 275–285. doi: [10.1016/j.susoc.2022.05.004](https://doi.org/10.1016/j.susoc.2022.05.004).
- [15] Korolyuk, S.R., & Kononets, N.V. (2022). *Application of simulation as an interactive teaching method*. In *Resource-oriented learning in “3D”: Accessibility, dialogue, dynamics* (pp. 165–167). Poltava: PUET.
- [16] Kos, I.R. (2024). Artificial intelligence and interactive simulations as innovative learning tools in physics lessons. *Scientific Notes. Series: Pedagogical Sciences*, 215, 177–182. doi: [10.36550/2415-7988-2024-1-215-177-182](https://doi.org/10.36550/2415-7988-2024-1-215-177-182).
- [17] Kravchuk, G.T., & Shevchuk, T.V. (2019). Simulation as an interactive method of training future economists. *Physical and Mathematical Education*, 2(20), 59–65. doi: [10.31110/2413-1571-2019-020-2-010](https://doi.org/10.31110/2413-1571-2019-020-2-010).
- [18] Kurtz, M., Benabbou, A., Pons, C., & Broisin, J. (2025). Collaboration in virtual and remote laboratories for education: A systematic literature review. *International Journal of Computer-Supported Collaborative Learning*, 20, 549–603. doi: [10.1007/s11412-025-09454-7](https://doi.org/10.1007/s11412-025-09454-7).
- [19] Llanos-Ruiz, D., Abella-García, V., & Ausín-Villaverde, V. (2025). Virtual reality in higher education: A systematic review aligned with the sustainable development goals. *Societies*, 15(9), article number 251. doi: [10.3390/soc15090251](https://doi.org/10.3390/soc15090251).
- [20] Meronda, D., Widarti, H., & Yahmin, Y. (2025). Virtual laboratories in science education: A systematic review of effectiveness on conceptual understanding and learning outcomes. *Jurnal Pendidikan MIPA*, 26, 2020–2042. doi: [10.23960/jpmipa.v26i3.pp2020-2042](https://doi.org/10.23960/jpmipa.v26i3.pp2020-2042).
- [21] Mohammadi, M., Paasivara, M., & Kasurinen, J. (2025). Blended learning in higher education: Good practices in platforms and teacher support enhancing students’ motivation. *Education and Information Technologies*. doi: [10.1007/s10639-025-13770-8](https://doi.org/10.1007/s10639-025-13770-8).
- [22] Negahban, A. (2024). Simulation in engineering education: The transition from physical experimentation to digital immersive simulated environments. *SIMULATION*, 100(7), 695–708. doi: [10.1177/00375497241229757](https://doi.org/10.1177/00375497241229757).
- [23] Peters, T.D., & Stamp, P.L. (2021). The virtual workplace: The impact of embedding business simulations into classroom culture. *Journal of Education for Business*, 96(6), 373–380. doi: [10.1080/08832323.2020.1838411](https://doi.org/10.1080/08832323.2020.1838411).
- [24] Prigunov, O.V., & Yavorska, Yu.L. (2023). Innovative approaches and information technologies in the organisational support of educational activities. *Library Science. Documentary Science. Informatology*, 4, 146–155. doi: [10.32461/2409-9805.4.2023.294098](https://doi.org/10.32461/2409-9805.4.2023.294098).
- [25] Sakun, L., Pochtovyuk, S., Shevchuk, L., & Bilyk, O. (2020). Introduction of innovative educational methods in the organisation of the education process of electrical engineers. In *Proceedings of the 25th IEEE international conference on problems of automated electric drive*. Kremenchuk: IEEE. doi: [10.1109/PAEP49887.2020.9240837](https://doi.org/10.1109/PAEP49887.2020.9240837).
- [26] Senadheera, V.V., Ediriweera, D.S., & Rupasinghe, T.P. (2024). Instructional design models for digital learning in higher education: A scoping review. *Journal of Learning for Development*, 11(1), 15–26. doi: [10.56059/jl4d.v11i1.973](https://doi.org/10.56059/jl4d.v11i1.973).
- [27] Uryvskiy, L.O., Moshynska, A.V., & Osypchuk, S.O. (2022). *Simulation modeling of systems and processes in telecommunications*. Kyiv: National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute.”
- [28] Velez, A., & Alonso, R.K. (2025). Business simulation games for the development of decision making: Systematic review. *Education Sciences*, 15(2), article number 168. doi: [10.3390/educsci15020168](https://doi.org/10.3390/educsci15020168).

Лариса Шевчук

Доктор педагогічних наук, професор
Університет імені Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0002-8405-1168>

Андрій Григоренко

Аспірант
Університет імені Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0001-6856-9840>

Оксана Шевчук

Аспірант
Український державний університет імені Михайла Драгоманова
02000, вул. Пирогова, 9, м. Київ, Україна
<https://orcid.org/0009-0003-1901-690X>

Симуляційне навчання у вищій школі: оцінка сприйнятої ефективності та готовності студентів до розвитку професійних компетенцій

Анотація. Актуальність теми зумовлена необхідністю впровадження імітаційних технологій у професійну підготовку майбутніх фахівців в умовах цифровізації освіти та підвищених вимог до практичної компетентності, що підтверджується емпіричними результатами: 94,22 % опитаних студентів відзначили підвищення ефективності навчання при використанні симуляційних комплексів, а 97,77 % – позитивно оцінили навчальний процес у електронних симуляційних середовищах. Метою дослідження було виявлення чинників, що впливали на формування готовності студентів до використання імітаційних програмних комплексів у межах електронного освітнього середовища закладів вищої освіти. Емпірична база ґрунтувалася на результатах онлайн-анкетування, у якому взяли участь 450 студентів українських університетів на добровільних засадах. У ході дослідження аналізувалися ставлення здобувачів освіти до імітаційних технологій, їхні навчальні уподобання, а також рівень готовності до застосування програмно-симуляційних комплексів у навчальному процесі. Отримані результати показали, що електронне навчання із використанням симуляційних систем було ефективним за таких умов: реалістичність навчальних сценаріїв; можливість багаторазового відпрацювання практичних дій без ризику помилок у реальному середовищі; адаптація освітнього процесу до рівня підготовки студентів; підвищення мотивації завдяки інтерактивності та гейміфікації. Водночас було встановлено, що висновки щодо розвитку професійних компетентностей ґрунтувалися переважно на самооцінках здобувачів освіти, а тому потребували подальшої емпіричної перевірки з використанням об'єктивних методик діагностики. Практичне значення отриманих результатів полягало у можливості їх застосування для модернізації освітніх програм та вдосконалення електронного освітнього середовища закладів вищої освіти

Ключові слова: програмно-моделюючі комплекси; процес навчання; адаптивні освітні стратегії; електронне освітнє середовище

**Yury Polukarov***

PhD in Technical Sciences, Associate Professor
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"
03056, 37 Beresteyskyi Ave., Kyiv, Ukraine
<https://orcid.org/0000-0002-6261-3991>

Oleksiy Polukarov

PhD in Technical Sciences, Associate Professor
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"
03056, 37 Beresteyskyi Ave., Kyiv, Ukraine
<https://orcid.org/0000-0003-4260-0330>

Raising awareness of environmental safety among higher education students

Abstract. The purpose of this study was to analyse curricula and courses containing a patriotic component aimed at raising students' awareness of environmental safety. The research methodology included a theoretical analysis of curricula, a content analysis of potential risks at hazardous facilities, and the development of recommendations for improving curriculum content. The curricula provided students with knowledge of environmental safety, as well as civic and patriotic awareness, combining theoretical knowledge with practical skills in responding to emergencies. At the same time, insufficient integration of interdisciplinary and practical modules was identified, which limited the development of critical thinking, active citizenship, and the application of knowledge in real professional and social contexts. Content analysis showed that educational materials and regulatory documents systematise potential threats and classify them by type and level of danger, which enabled students to form an initial understanding of risks and to assess their impact on the educational process. Recommendations for improving academic disciplines include updating programme content through the inclusion of patriotic and civic components, strengthening interdisciplinary links, developing new modules and specialised courses, integrating modern digital technologies and artificial intelligence for the analysis of environmental data, improving criteria for assessing civic competencies, and expanding partnerships between educational institutions and public organisations. The implementation of these changes is intended to foster in students a holistic understanding of the role of a specialist in society, to increase motivation to preserve national identity, and to develop environmental responsibility, critical thinking, and civic engagement as components of professional training. The practical significance of this work lies in the fact that its results can be used by teachers of environmental safety and civil protection disciplines to design curricula and practical classes on risk modelling at hazardous facilities

Keywords: students; teachers; protective measures; civil protection; emergencies

INTRODUCTION

The relevance of this study is determined by the need to increase environmental awareness among higher education students in the context of intensifying global environmental problems, particularly climate change, environmental pollution, and the depletion of natural resources. Despite

the growing number of educational programmes, the formation of environmental awareness remains insufficiently integrated into the educational process, which creates gaps in the preparation of future specialists for responsible professional activity. It is within the student community

Suggested Citation:

Polukarov, Yu., & Polukarov, O. (2026). Raising awareness of environmental safety among higher education students. *Scientia et Societis*, 5(1), 30-41. doi: 10.69587/ss/1.2026.30.

*Corresponding author (yurypolukarov@ukr.net)



that the potential for environmental culture, values, and an active civic position necessary for the implementation of the principles of sustainable development is formed. The research problem is to identify effective pedagogical approaches that ensure not only the acquisition of environmental knowledge, but also the development of conscious responsibility for nature conservation.

Researchers have examined various approaches, methods, and educational models that contribute to the development of students' environmental awareness in the process of implementing the principles of sustainable development. For example, the study by M. Ali *et al.* (2023) demonstrated that educational programmes aimed at developing students' environmental awareness increase their understanding of environmental problems through a combination of theoretical instruction and practical tasks. The authors showed that an interdisciplinary approach contributes to awareness of the relationships between natural processes and human activities. Similar results were obtained in the study by J. Debrah *et al.* (2021), which emphasised that formal education plays a positive role in disseminating knowledge about solid waste management in developing countries. In particular, the researchers highlighted that increasing students' environmental awareness through training courses and information campaigns led to changes in behavioural patterns and contributed to a transition towards a more responsible attitude to resource consumption. The problem of integrating environmental education into higher education is examined in the work of T. Ferguson & C. Roofe (2020), who focused on the challenges and opportunities associated with implementing the fourth Sustainable Development Goal related to ensuring quality education within the university system. In addition, involving students in environmental projects and volunteer initiatives not only increases awareness, but also develops civic engagement and responsibility.

The article by T. Kuts & O. Makarchuk (2023) found that students of the National University of Life and Environmental Sciences of Ukraine demonstrate an average level of environmental awareness, while showing a high willingness to participate in environmental protection activities. It was also determined that the effectiveness of environmental education increases under conditions of active use of interactive methods, environmental training, and project-based work. The study by E. Manolis & E. Manoli (2021) demonstrated that the implementation of environmental projects within university programmes ensures the formation of students' understanding of global environmental problems and the goals of sustainable development. Their results showed that such projects stimulate the development of critical thinking and collective responsibility, forming a sense of personal involvement in solving environmental challenges among students. In a broader analytical dimension, B. Mahanta & B. Sarkar (2023) conducted a literature review on the integration of education, research, campus management, and community initiatives to ensure sustainability in higher

education. The researchers concluded that the integration of these components ensures more effective implementation of environmental principles in the educational process, as students are involved in real-world environmental practices within the university context.

The issue of environmental education during periods of socio-political instability was addressed in the study by T. Nahirniak (2022), which noted that even under conditions of martial law in Ukraine, the formation of environmental culture remains a necessary component of national security. Increasing the environmental awareness of citizens, particularly students, is viewed as a means of strengthening societal resilience. The social dimension of environmental education was analysed by G. Santos *et al.* (2020), who found that the corporate social responsibility of higher education institutions has a positive impact on the quality of educational services and on levels of student satisfaction. The study by C. Toquero (2020) focused on new educational opportunities that emerged during the COVID-19 pandemic. The author noted that distance learning formats provide additional resources for the development of environmental awareness through the use of digital platforms that offer access to environmental information, interactive courses, and international discussions. The international dimension of disseminating the ideas of sustainable development in higher education was highlighted by V. Zinchenko *et al.* (2021), who analysed the potential of universities in implementing environmental strategies. They concluded that Ukraine is gradually integrating European approaches to the development of environmental education; however, this process requires systematic updating of programmes and an increased level of interdisciplinarity.

The above studies revealed gaps in the alignment of curricula and courses with a patriotic component with state and European standards, as well as insufficient integration of practical safety aspects related to work with high-risk facilities. In addition, a lack of systematised data on harmful and hazardous production factors within the educational process was identified, indicating the need for further modelling and risk assessment. The purpose of this study was to examine the content of curricula and disciplines that include a patriotic component, with an emphasis on shaping students' understanding and awareness of environmental risks and hazards. The objectives of the study were: (1) to conduct a comparative analysis of curricula and courses with a patriotic component; (2) to assess potential environmental risks within the discipline "Environmental Safety and Civil Protection"; (3) to model scenarios of harmful and hazardous production factors; and (4) to formulate recommendations and proposals for improving these disciplines.

MATERIALS AND METHODS

The study was conducted in May 2025 at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". This higher education institution was

selected because it is a leading university in Ukraine with a well-developed infrastructure for training specialists in the field of occupational health and environmental safety. The study involved a comparative analysis of current curricula and courses that include a patriotic component. For this purpose, the following educational programmes were examined: the National University of Civil Protection of Ukraine – Educational and Professional Programme “Ecological Safety” (2024), Lviv State University of Life Safety – Educational and Professional Programme “Occupational Safety” (2024), and Igor Sikorsky Kyiv Polytechnic Institute – Educational and Professional Programme “Occupational Health and Safety” (2025).

These programmes were selected because they contain, or allow for the integration of, a patriotic component and civic education, which corresponds to the objectives of the study concerning the development of students’ civic competence. The analysis of curriculum content was carried out on the basis of the state standards of Ukraine, in particular the Order of the Ministry of Education and Science of Ukraine No. 96 “On Approval of Higher Education Standards” (2024), the Order of the Ministry of Education and Science of Ukraine No. 1076 “On Approval of the Higher Education Standard for Specialty 101 “Ecology” for the First (Bachelor’s) Level of Higher Education” (2018), and the DSTU ISO 45001:2019 (2019). The evaluation of curricula in relation to European trends was conducted using documents of the Organisation for Economic Co-operation and Development (2025) and the Council of Europe (2018). In addition, current trends in environmental threats were described on the basis of documents from the International Energy Agency (2025).

A comparative analysis of the curricula was carried out according to the following parameters: content blocks of patriotic and civic education, integration of environmental and civil security, and compliance with state and international standards. A content analysis of potential risks associated with nuclear power plants and other high-risk facilities (chemical plants, oil and gas refineries, fuel and ammunition depots, and hydraulic structures) under wartime conditions was conducted within the discipline “Environmental Safety and Civil Protection”. This content analysis was performed by systematising threats at nuclear, chemical, oil and gas, and other critically important facilities, and by assessing the probability of their occurrence and their potential impact on the educational process using data from state regulatory documents, educational materials, and international publications. The sources of information included course teaching materials, state regulatory documents on civil protection, and international publications on the safety of nuclear and critically important facilities, in particular those of the International Atomic Energy Agency (2025) and the United Nations Office for Disaster Risk Reduction (2021). The method involved systematising potential threats and assessing their probability and impact on the educational process. Based on the research conducted,

recommendations were developed to improve the content of the disciplines.

RESULTS

Comparative analysis of curricula and courses with a patriotic component

Curricula in higher education institutions ensure that students are aware of environmental threats and promote a holistic understanding of the relationship between human activity and the state of nature. Among the main environmental threats that students should recognise are climate change and global warming, air, water, and soil pollution, deforestation, overuse of natural resources, waste accumulation, and biodiversity loss (Vilcapoma-Malpartida *et al.*, 2023). These phenomena affect human health, economic stability, and quality of life; therefore, the educational process is aimed at fostering a responsible attitude towards the environment and an understanding of the consequences of individual actions. Curricula include disciplines related to ecology, sustainable development, climate change, and energy efficiency, which enable students to acquire knowledge about the causes and consequences of environmental crises and ways of overcoming them (Shri & Tiwari, 2021). The use of an interdisciplinary approach makes it possible to integrate environmental, social, economic, and technological aspects, demonstrating how professional activity in any field influences the state of nature.

Within the framework of the comparative analysis, it was found that the patriotic component is integrated into curricula through disciplines that develop the ability to act under conditions of risk, knowledge of the regulatory and legal foundations of civil protection, and skills for responding to emergency situations. The Educational and Professional Programme “Ecological Safety” (2024) at the National University of Civil Protection of Ukraine (Faculty of Technogenic and Environmental Safety, Department of Occupational Safety and Technogenic and Environmental Safety) provides training for bachelors in ecology with a specialisation in environmental safety. The programme comprises 240 European Credit Transfer and Accumulation System (ECTS) credits and is accredited by the Ministry of Education and Science of Ukraine until 2023. It is delivered in Ukrainian and includes problem-oriented and student-centred learning through lectures, seminars, practical and laboratory classes, distance-learning platforms, and the case method. The programme develops general (K01-K13), special (K14-K26), and complex professional competencies (SK27-SK31), which enable students to solve complex tasks in the field of ecology, assess environmental conditions, predict the consequences of emergencies, implement environmental monitoring, manage environmental projects, and conduct public education activities. Graduates may be employed as environmental safety specialists, state supervision inspectors, or consultants in environmental management, or may continue their studies at the master’s level to obtain additional qualifications.

In contrast, the master's Educational and Professional Programme "Occupational Safety" (2024), implemented at Lviv State University of Life Safety, is aimed at training highly qualified specialists in the field of civil and industrial safety, labour protection, and risk management. The programme combines theoretical and practical training and includes the study of concepts, categories, principles, and strategies for the development of civil security, as well as methods of assessment, modelling, and risk management, and tools for protecting the population, territories, and facilities in emergency situations. It integrates lectures, practical classes, seminars, laboratory work, course projects, and practical training based at the State Emergency Service of Ukraine, governmental bodies, and enterprises, which enables students to apply their knowledge in real conditions. The programme develops competencies in research and innovation activities, including information analysis, effective decision-making, team management, planning preventive and emergency measures, the use of modern information technologies, and international cooperation in the field of civil security. Training in the assessment and minimisation of industrial and technogenic risks contributes to ensuring occupational safety and preventing accidents and occupational diseases, thereby increasing students' awareness of environmental and technogenic threats. Graduate employment opportunities include positions as industrial safety experts, occupational safety engineers, department heads, researchers, and teachers. Thus, the programme integrates modern scientific knowledge and practical skills aimed at developing a comprehensive understanding of civil safety, occupational safety, and risk management in the context of industrial and environmental threats.

The Educational and Professional Programme "Occupational Safety" at the second (Master's) level of higher education is focused on training specialists capable of managing occupational risks and ensuring the safety and

health of workers through a risk-based approach, the principles of sustainable development, and compliance with national and international legislation. The programme provides instruction in practical methods and tools for monitoring working conditions, including the use of sound level meters, vibrometers, lux meters, gas analysers, dust meters, thermal imagers, dosimeters, and multifunctional meteorological instruments to assess physical, chemical, and radiation factors in the production environment. Considerable attention is devoted to auditing and monitoring working conditions in accordance with the requirements of the DSTU ISO 45001:2019 (2019), the application of HAZOP, FMEA, and risk matrices, as well as the use of software tools for processing measurement results and predicting occupational risks. The programme ensures the development of competencies in designing engineering, technical, and organisational safety measures, preparing feasibility studies, implementing occupational health and safety management systems, conducting briefings and staff training, and making managerial decisions in an interdisciplinary and international professional environment. All three programmes, despite differences in level of training and structure, integrate environmental, technogenic, and civic components harmonised with European approaches to safety and civic education. Their distinctive feature lies in the combination of theoretical instruction with a substantial number of practical classes, simulations, and team-based exercises, which enables the formation of not only professional but also socially responsible competencies in future specialists. Curricula in higher education institutions must comply with the state standards of Ukraine and European trends in civic education, as such compliance ensures the coherence of educational objectives, the development of professional and civic competencies, and the improvement of the quality of training of future specialists (Table 1).

Table 1. Comparative analysis of curricula according to the criteria of compliance with state standards of Ukraine and European trends in civic education

Name of educational programme	Compliance with state standards of Ukraine	Compliance with European trends in civic education
Educational-Professional Programme "Ecological Safety"	The programme is developed in accordance with the Order of the Ministry of Education and Science of Ukraine No. 96 and the Order of the Ministry of Education and Science of Ukraine No. 1076. It ensures the formation of competencies in environmental safety, assessment of anthropogenic risks, environmental monitoring, and the management of natural systems. The curriculum includes the following disciplines: Ukrainian language (for professional orientation), higher mathematics, physics, a foreign language, fundamentals of information technologies, environmental safety, general ecology, meteorology and climatology, and environmental monitoring as mandatory components of the programme.	The programme is consistent with the approaches of the Organisation for Economic Co-operation and Development. It develops civic competencies through the topics "Environmental Responsibility of the Community", "European Environmental Policy", and "Public Participation in Environmental Decision-Making". It includes field practice, case analysis (for example, "Protection of Natura 2000"), and group work on environmental projects, which foster active citizenship and responsibility for the environment.

Table 1. Continued

Name of educational programme	Compliance with state standards of Ukraine	Compliance with European trends in civic education
Educational and Professional Programme "Occupational Safety"	The programme corresponds to the Order of the Ministry of Education and Science of Ukraine No. 1076. It includes professional competencies in occupational safety management, industrial risk analysis, safety expertise, and operational planning of civil protection measures. The main disciplines are: professional foreign language, economics of occupational safety and technogenic safety, technogenic safety of facilities and modern production technologies, workplace ergonomics, emergency risk management, occupational safety management systems in industry, and public administration in the field of civil security.	The programme is harmonised with the Council of Europe recommendations on the civic training of security professionals. It integrates instruction in leadership in crisis situations, the ethics of professional activity, and democratic decision-making in production contexts. The curriculum includes the following topics: "Civic Responsibility of an Occupational Safety Engineer", "Communication in a Multicultural Environment during Emergencies", and "Rights of the Employee and the Employer". Practical classes develop competencies related to cooperation, respect for human rights, and responsibility to society, in line with the framework of the International Association for the Evaluation of Educational Achievement, through simulations such as "Evacuation", "Incident Investigation", and "Collective Decision-Making in a Crisis".
Occupational Health and Safety Educational and Professional Programme	The programme is developed in accordance with the requirements of the Law "On Civil Protection of the Population", DSTU (State Standard of Ukraine, harmonised with the International Organization for Standardization standard) ISO 45001:2019, and the National Qualifications Framework. Professional disciplines include occupational health and safety, industrial sanitation, occupational psychology, risk management and occupational risks, technical expertise of production equipment, methods of control and measurement of harmful factors, occupational health and safety in construction and production, and audit and certification of occupational health and safety management systems.	The programme corresponds to European trends in Networking European Civic Education through the integration of the topics "Social Responsibility of a Citizen in the Field of Security" and "Culture of Security in the Community". The practical component includes training in joint decision-making, modelling of public consultations, and the analysis of European case studies (for example, the response of the ERCC system). It develops civic competencies related to participation in democratic processes concerning environmental decisions and responsibility.

Source: compiled by the authors based on Educational and Professional Programme "Ecological Safety" (2024), Educational and Professional Programme "Occupational Safety" (2024), Educational and Professional Programme "Occupational Health and Safety" (2025), Order of the Ministry of Education and Science of Ukraine No. 96 "On Approval of Higher Education Standards" (2024), Order of the Ministry of Education and Science of Ukraine No. 1076 "On Approval of the Higher Education Standard for Specialty 101 "Ecology" for the First (Bachelor) Level of Higher Education" (2018), DSTU ISO 45001:2019 (2019), Organisation for Economic Co-operation and Development (2025), Council of Europe (2018), International Energy Agency (2022)

The analysis of the content of educational programmes indicates that they generally comply with the state standards of Ukraine and contemporary European trends in civic education, as they provide for the integration of patriotic and ethical components into the professional training of students. The programmes are oriented towards the development of environmental and civic awareness, responsibility for occupational safety, environmental protection, and adherence to social norms. However, there is a lack of systematic integration of practical modules aimed at fostering civic engagement, critical thinking, and student participation in socially significant initiatives. The training courses do not sufficiently incorporate interdisciplinary approaches that would enable the integration of professional knowledge with civic and patriotic values. Therefore, further improvement of

the programmes requires the inclusion of components that ensure the practical application of acquired knowledge in the context of sustainable development, social responsibility, and active citizenship.

Assessment of potential risks within the discipline "Environmental Safety and Civil Protection"

Teachers and students are required to follow clear algorithms for assessing potential risks within the discipline of the Educational and Professional Programme "Occupational Health and Safety" (2025). These algorithms include identifying hazardous facilities, determining types of threats (physical, chemical, nuclear, or technological), assessing the likelihood of their occurrence and their potential impact on health, safety, and the educational process, modelling emergency scenarios, and developing and

applying preventive measures and action protocols in the event of accidents. Compliance with these procedures enables students to systematically develop risk management skills and a responsible attitude towards safety, while allowing teachers to effectively manage the learning process and evaluate the acquisition of theoretical knowledge and practical skills, thereby ensuring a safe and well-prepared

environment for emergency situations. Table 2 presents methods for identifying, assessing, and modelling risks at hazardous facilities, including nuclear power plants, chemical and oil and gas processing plants, fuel and ammunition depots, and hydraulic structures, together with specific examples of threats and recommendations for teachers and students regarding safe actions.

Table 2. Ways to indicate the risks of hazardous objects for teachers and students

Dangerous object	Potential risks	Concrete examples for students and teachers
Nuclear power plant	Radiation pollution, explosions, fires	Radiation leak simulation, evacuation exercises, use of dosimeters during practical classes
Chemical plants	Toxic gases, chemical burns, explosions	Analysis of ammonia or chlorine leak scenarios, demonstration of personal protective equipment, development of action plans
Oil and gas refining enterprises	Explosions, fires, gas poisoning	Simulation of tank fires, control of safe distances, use of gas masks
Fuel and ammunition depots	Explosions, fires, debris	Simulation of dangerous situations, practice of evacuation routes, instruction in handling hazardous materials
Waterworks	Floods, dam failures, man-made accidents	Dam breach modelling, assessment of the risk of flooding of training laboratories, development of safety measures

Source: compiled by the authors

Table 2 demonstrates approaches to identifying risks at hazardous facilities for teachers and students, which enables the systematic introduction of potential threats to participants in the educational process, the practice of safe behaviour algorithms, and the development of practical skills for responding to emergencies. For each type of facility, including nuclear power plants, chemical plants, oil and gas refineries, fuel and ammunition depots, and hydraulic structures, specific risks are identified, ranging from radiation contamination and explosions to toxic gas releases and floods, and practical modelling examples are developed accordingly. Students perform exercises related to evacuation, maintaining safe distances, and using dosimeters and personal protective equipment, while teachers demonstrate accident scenarios and supervise the safe conduct of classes. This approach increases risk awareness, promotes the development of responsibility for one's own safety and the safety of others, ensures practical training in response algorithms, and creates conditions for integrating theoretical knowledge with real skills in the field of environmental safety and civil protection. As a result, it positively affects the effectiveness of the educational process and students' readiness to act in crisis situations.

Content analysis of the sources used makes it possible to identify key features of preparing students and teachers to work with potential risks in the field of environmental safety and civil protection. Course training materials systematise potential threats and classify them by type and level of danger, enabling students to form an initial understanding of risks and to assess their impact on the educational process. State regulatory documents on civil protection provide specific algorithms for action in emergency situations and establish criteria for safe behaviour and rules for the use of personal protective equipment,

which allows teachers to structure practical classes and to verify students' compliance with safety requirements. The International Atomic Energy Agency (2025) outlines methodological approaches to developing simulation models of hazardous facilities, providing opportunities to practise action algorithms in a controlled environment and to assess the effectiveness of preventive measures. At the same time, the United Nations Office for Disaster Risk Reduction (2021) offers structured recommendations on prioritising actions during crisis events and on assessing the probability and severity of their consequences, which enables the integration of international risk management standards into curricula and the development of students' competencies in planning and responding to emergencies.

These recommendations primarily include a clear definition of the sequence of actions during emergencies, assessment of the probability of specific threats, and evaluation of the severity of their consequences for people, equipment, and the environment. They also include algorithms for early risk detection, measures for accident and disaster prevention, evacuation planning, organisation of rescue and response teams, and monitoring compliance with safety procedures in educational and industrial environments. The combination of these sources creates a comprehensive basis for learning: one group of documents systematises threats and their impact on the educational process, another provides clear protection algorithms and risk assessment criteria, and a third supplements these with international methods and standards for modelling emergency situations. This approach enables students not only to master theoretical knowledge but also to acquire practical skills in predicting risks, assessing their probability and consequences, and developing effective safety measures during practical classes and in real professional environments.

Recommendations and proposals for improving disciplines

Recommendations for improving academic disciplines encompass several key areas: updating programme content to include systematic topics in civic and patriotic education; integrating historical, cultural, and national contexts into professional subjects; strengthening interdisciplinary links between humanities, technical, and social science courses; introducing practical forms of learning aimed at developing social responsibility; establishing unified criteria for assessing the formation of civic and patriotic competencies; training teachers to work with patriotically oriented materials; and developing new educational modules and specialised courses that highlight examples of Ukraine's contribution to world science, culture, and technology. It is also advisable to expand cooperation between educational institutions and public organisations, museums, military units, and research centres in order to implement joint projects that foster an active civic position among students.

The need for these changes arises from the fact that the existing programmes do not sufficiently demonstrate the practical connection between professional competencies and civic responsibility. The inclusion of a patriotic component across all educational fields will ensure a holistic understanding of students' own role in national development. Updating programme content will promote not only the acquisition of knowledge but also the willingness to act responsibly, for example through the analysis of national innovations and participation in social initiatives or volunteer projects. The integration of historical and cultural contexts will enhance students' motivation to preserve national identity, as they will perceive a direct link between their profession and their contribution to strengthening the country. Interdisciplinary coordination of disciplines will support the formation of a broader worldview in which knowledge of statehood, security, human rights, and ethical responsibility becomes an integral part of every specialisation. This approach will eliminate duplication of topics and establish a coherent logic within the educational process. A strong practical component, such as participation in volunteer activities, environmental initiatives, or public research, will help transform theoretical knowledge into real experience of civic engagement. Training teachers to apply these approaches will improve the quality of teaching, as educators will be able not only to transmit knowledge but also to cultivate a patriotic stance through examples from their own professional practice.

The development of new educational modules and specialised courses will address gaps in existing programmes, particularly in relation to national defence capability, cultural heritage, and the technological development of Ukraine. This will enable students to recognise the importance of national achievements for global progress and foster a sense of pride in their country. It is recommended that topics related to artificial intelligence and intelligent systems focused on the analysis of environmental data be integrated into academic disciplines. The implementation

of this recommendation should include both theoretical and practical modules aimed at processing large datasets, interpreting the results of computer modelling, and using digital platforms to identify and predict environmental risks. This approach will contribute to the development of students' data-handling abilities, increase cognitive engagement, and strengthen critical thinking and analytical skills. The introduction of clear criteria for assessing civic and patriotic competencies will render this process measurable and controllable rather than purely formal. Finally, partnerships with non-university institutions will broaden the educational space and contribute to the formation of a socially active generation of young specialists who combine professional expertise with civic responsibility.

DISCUSSION

The results of the study indicate that the implementation of environmentally oriented curricula in higher education institutions contributes to increasing students' awareness of global and local environmental threats, fosters a conscious attitude towards the natural environment, and promotes readiness to act in accordance with the principles of sustainable development. The observed increase in environmental competence is consistent with the findings of M. Alenezi *et al.* (2023) and G. Oliveira *et al.* (2021), who demonstrated the necessity of integrating the concept of environmental threats into the educational process in order to strengthen students' ability to understand the global challenges of sustainable development. It was found that, as a result of curriculum implementation, students developed a better understanding of the relationship between human activity and environmental conditions, as well as the consequences of the irrational use of natural resources. Similar conclusions were reported by H. Al-Samarraie *et al.* (2019), who established that environmental education increases the level of responsibility among future specialists and stimulates environmentally oriented behaviour. Likewise, the results correspond with the study by F. Campbell *et al.* (2022), which emphasised the positive role of environmental disciplines in developing students' systems thinking and their understanding of the interdependence between natural and socio-economic processes. Comparative analysis showed that, within the present study, emphasis was placed on the practical mastery of concepts related to environmental protection and responsible resource management, whereas the works of the cited authors predominantly adopted a theoretical and analytical approach. Nevertheless, the shared outcome confirms that curricula focused on environmental education contribute to the formation of value orientations and the development of civic consciousness.

The formation of environmental awareness was closely associated with the inclusion of modules on local environmental problems and the encouragement of active student engagement in environmental protection activities, which ensured deeper knowledge acquisition and increased the effectiveness of environmental education. This finding is

consistent with the conclusions of F. Campbell *et al.* (2022), and M. Sá & S. Serpa (2020), who emphasised the importance of students' perception of environmentally oriented academic content. The analysis of curricula demonstrated partial compliance with the state standards of Ukraine and European approaches to civic education; however, the level of integration of the patriotic component remains insufficient. Although the programmes include individual modules and topics aimed at fostering civic responsibility, they do not always ensure the systematic formation of national identity through academic content. In line with the observations of M. Ayu (2020), learning effectiveness increases when students are actively engaged in understanding social and cultural values, a conclusion also supported by the findings of this study. At the same time, as noted by K. Elumalai *et al.* (2021), educational programmes require flexible methodological solutions that promote student independence and initiative in combination with patriotic education. The results obtained are further consistent with the conclusions of N. Hidayati *et al.* (2020), who highlighted the importance of using national cultural values as a means of enhancing the relevance of educational content.

The most effective means of increasing environmental awareness were identified as relevant civil protection documents and civic education curricula that provide an interdisciplinary approach and, according to T. Gkrimpizi *et al.* (2023), serve as a key factor in shaping awareness of the global scale of environmental threats. Student involvement in collective problem-solving related to environmental issues fostered responsibility for environmental safety and readiness to respond to potential risks, in line with international initiatives in the field of sustainable development. Increased motivation for environmentally oriented activities was consistent with the conclusions of F. Guangul *et al.* (2020) and T. Rasul *et al.* (2023), who emphasised the importance of students' practical participation in collective projects and the development of a responsible attitude towards environmental safety. The identified trends indicate the need for a systematic approach to environmental education, which corresponds with the recommendations of Y. Villarreal Arroyo *et al.* (2023) and S. Rawas (2023), according to whom training should encompass cognitive, emotional-value, and behavioural components in order to develop practical competencies in the field of safety. Within the discipline "Environmental Safety and Civil Protection", teachers and students followed clearly defined algorithms for assessing potential risks, including the identification of hazardous objects, determination of threat types (physical, chemical, nuclear, or technological), assessment of the probability of occurrence and potential impact on health, safety, and the educational process, modelling of emergency scenarios, and the development of preventive measures and action protocols in the event of accidents.

Content analysis of the sources, including documents of the United Nations Office for Disaster Risk Reduction (2021), confirmed the importance of a systematic approach to risk modelling at critical facilities and the

integration of international risk management standards into curricula. These documents provided clear algorithms for assessing the probability and severity of potential accidents and defined priorities of action during emergencies, evacuation procedures, and the organisation of response teams. This enabled students to predict potential accident consequences, assess their impact on people, equipment, and the environment, and allowed teachers to monitor compliance with safety measures and to teach appropriate actions in real conditions. A comprehensive approach to student training, combining theoretical knowledge with practical exercises in risk assessment, was consistent with the findings of K. Basile *et al.* (2020) and M. Kuo *et al.* (2019), who emphasised the role of social experience and mutual support in shaping young people's responsible attitudes towards the environment. The study demonstrated that the integration of knowledge about potential threats with their practical modelling increased students' environmental awareness and formed competencies in risk prediction, impact assessment, and the development of effective safety measures. This result is consistent with the conclusions of K. Martzoukou *et al.* (2020) and contributes to a more conscious attitude towards environmental threats and to the development of critical thinking.

The study formulated recommendations aimed at improving the quality of environmental education and fostering responsible student behaviour. In particular, it is recommended to increase students' involvement in practical environmental initiatives, such as volunteer activities related to territory clean-up or participation in environmental monitoring. This recommendation is justified by its potential to enhance awareness of the consequences of human activity, to develop environmental responsibility, and to reduce stress and anxiety among students, as confirmed by the findings of M. Mofatteh (2020). Another recommendation concerns the expansion of analytical components in curricula, specifically through the inclusion of modules that demonstrate the relationship between technological processes and environmental change. This approach enhances students' critical thinking, supports the assessment of the ecological impact of innovations, and stimulates independent work with environmental data, which is consistent with the results reported by I. Sanusi *et al.* (2022). It is also necessary to integrate topics related to artificial intelligence and intelligent systems for the analysis of environmental data into training courses. This strengthens students' ability to work with large volumes of information, increases cognitive engagement, and promotes critical thinking, as confirmed by the findings of J. Southworth *et al.* (2023).

In addition, it is advisable to incorporate elements of local cultural and environmental values into course content. This enhances students' awareness of the importance of preserving local ecosystems and contributes to the formation of an ethical attitude towards nature, which correlates with the results of N. Hidayati *et al.* (2020). The implementation of these recommendations is necessary to ensure that the educational process not only transmits

knowledge but also develops socially responsible and environmentally conscious skills in students. In particular, Ukrainian programmes were found to demonstrate progress in fostering civic awareness, but to require deeper integration of the patriotic component in accordance with contemporary educational trends. The analysis showed that combining the theoretical study of environmental threats with practical analysis of environmental data contributes to the development of students' ability to predict the scale of potential risks and to assess their impact on populations, natural resources, and ecosystems. It was also found that the integration of digital monitoring tools, analytical systems, and artificial intelligence into the educational process enhances awareness of global and local environmental challenges and supports the development of responsible and environmentally conscious behaviour.

CONCLUSIONS

The results of the analysis of the curricula demonstrate that they largely comply with the state standards of Ukraine and contemporary European trends in civic education. The programmes integrate patriotic and ethical components and ensure the development of environmental and civic awareness, as well as responsibility for occupational safety and environmental protection. At the same time, the programmes lack systematic integration of practical modules aimed at fostering civic engagement, critical thinking, and student participation in socially significant initiatives. Interdisciplinary approaches are insufficiently represented, which limits the integration of professional knowledge with patriotic and civic values. To enhance the effectiveness of the educational process, practical components should be introduced that enable students to apply the knowledge acquired.

Within the discipline "Environmental Safety and Civil Protection", the assessment of potential risks enabled students and teachers to systematically familiarise themselves with hazardous facilities and types of threats, including nuclear power plants, chemical and oil and gas processing plants, fuel and ammunition depots, and hydraulic structures. The performance of practical exercises involving the modelling of leaks, fires, toxic gas releases, and floods contributed to the development of skills in risk forecasting, the use of personal and collective protective equipment,

evacuation planning, and the formulation of action algorithms for emergency situations. Content analysis of the sources revealed that educational materials systematised threats and their impact on the educational process, state regulatory documents provided clear protection algorithms and risk assessment criteria, and international publications offered methods for modelling crisis event scenarios. This integration of theoretical knowledge with practical skills increased awareness of hazards, responsibility for the safety of others, and students' readiness to respond under real environmental and technogenic conditions.

Recommendations for improving academic disciplines focus on enhancing student training through the inclusion of topics related to civic and patriotic education, historical and cultural contexts, and interdisciplinary connections. Practical classes, participation in volunteer and social projects, teacher training, and the development of new modules make it possible to transform theoretical knowledge into real experience and to foster a patriotic position, responsibility for national development, and pride in national achievements. Unified assessment criteria and co-operation with non-university institutions ensure greater controllability of the educational process and support the development of socially active specialists. A limitation of the study is that the programmes were analysed at only one university, which reduces the representativeness of the findings and does not allow the conclusions to be unequivocally extended to other educational institutions. A perspective for further research is the investigation of the application of generative artificial intelligence models in the educational process of environmental safety and civil protection, particularly their influence on the development of analytical thinking, student autonomy, and the effectiveness of emergency scenario modelling.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Alenezi, M., Wardat, S., & Akour, M. (2023). The need of integrating digital education in higher education: Challenges and opportunities. *Sustainability*, 15(6), article number 4782. doi: 10.3390/su15064782.
- [2] Ali, M.I., Abduh, A., Mahmud, R., & Dunakhir, S. (2023). Raising students' awareness on environmental education issues. *Indonesian Journal of Educational Research and Review*, 6(1). doi: 10.23887/ijerr.v6i1.59146.
- [3] Al-Samarraie, H., Shamsuddin, A., & Alzahrani, A.I. (2019). A flipped classroom model in higher education: A review of the evidence across disciplines. *Educational Technology Research and Development*, 68(3), 1017-1051. doi: 10.1007/s11423-019-09718-8.
- [4] Ayu, M. (2020). Online learning: Leading e-learning at higher education. *The Journal of English Literacy Education: The Teaching and Learning of English as a Foreign Language*, 7(1), 47-54. doi: 10.36706/JELE.V7I1.11515.
- [5] Basile, K.C., Clayton, H.B., DeGue, S., Gilford, J.W., Vagi, K.J., Suarez, N.A., Zwald, M.L., & Lowry, R. (2020). Interpersonal violence victimization among high school students – youth risk behavior survey, United States. *MMWR Supplements*, 69(1), 28-37. doi: 10.15585/mmwr.su6901a4.

- [6] Campbell, F., Blank, L., Cantrell, A., Baxter, S., Blackmore, C., Dixon, J., & Goyder, E. (2022). Factors that influence mental health of university and college students in the UK: A systematic review. *BMC Public Health*, 22(1), article number 1778. doi: [10.1186/s12889-022-13943-x](https://doi.org/10.1186/s12889-022-13943-x).
- [7] Council of Europe. (2018). *Reference framework of competences for democratic culture*. Strasbourg: Council of Europe.
- [8] Debrah, J.K., Vidal, D.G., & Dinis, M.A. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, 6(1), article number 6. doi: [10.3390/recycling6010006](https://doi.org/10.3390/recycling6010006).
- [9] DSTU ISO 45001:2019. (2019). *Occupational health and safety management systems*. Retrieved from https://zakon.isu.net.ua/sites/default/files/normdocs/dstu_iso_45001_2019.pdf.
- [10] Educational and Professional Programme “Occupational Health and Safety”. (2025). Retrieved from https://opcb.kpi.ua/wp-content/uploads/2025/03/I5_OPPM_OHaS_End.pdf.
- [11] Educational and Professional Programme “Ecological Safety”. (2024). Retrieved from https://fubn.nuczu.edu.ua/images/osvitni-programi/2023/101_bak_2024_project.pdf.
- [12] Educational and Professional Programme “Occupational Safety”. (2024). Retrieved from <https://drive.google.com/file/d/1fXxsXK-gighiHZsUzixASxRvERvetxMr/view>.
- [13] Elumalai, K.V., Sankar, J.P., Kalaichelvi, R., John, J.A., Menon, N., Alqahtani, M.S., & Abumelha, M.A. (2021). Factors affecting the quality of e-learning during the COVID-19 pandemic from the perspective of higher education students. *Journal of Information Technology Education: Research*, 19, 731-753. doi: [10.28945/4628](https://doi.org/10.28945/4628).
- [14] Ferguson, T., & Roofe, C.G. (2020). SDG 4 in higher education: Challenges and opportunities. *International Journal of Sustainability in Higher Education*, 21(5), 959-975. doi: [10.1108/IJSHE-12-2019-0353](https://doi.org/10.1108/IJSHE-12-2019-0353).
- [15] Gkrimpizi, T., Peristeras, V., & Magnisalis, I. (2023). Classification of barriers to digital transformation in higher education institutions: Systematic literature review. *Education Sciences*, 13(7), article number 746. doi: [10.3390/educsci13070746](https://doi.org/10.3390/educsci13070746).
- [16] Guangul, F.M., Suhail, A.H., Khalit, M.I., & Khidhir, B.A. (2020). Challenges of remote assessment in higher education in the context of COVID-19: A case study of Middle East College. *Educational Assessment, Evaluation and Accountability*, 32(4), 519-535. doi: [10.1007/s11092-020-09340-w](https://doi.org/10.1007/s11092-020-09340-w).
- [17] Hidayati, N.A., Waluyo, H.J., Winarni, R., & Suyitno (2020). Exploring the implementation of local wisdom-based character education among Indonesian higher education students. *International Journal of Instruction*, 13(2), 179-198. doi: [10.29333/iji.2020.13213a](https://doi.org/10.29333/iji.2020.13213a).
- [18] International Atomic Energy Agency. (2025). *Nuclear Technology and Applications*. Retrieved from <https://www.iaea.org/topics/nuclear-technology-and-applications>.
- [19] International Energy Agency. (2022). *ICCS: International Civic and Citizenship Education Study*. Retrieved from <https://www.iea.nl/studies/iea/iccs>.
- [20] Kuo, M., Barnes, M., & Jordan, C. (2019). Do experiences with nature promote learning? Converging evidence of a cause-and-effect relationship. *Frontiers in Psychology*, 10, article number 305. doi: [10.3389/fpsyg.2019.00305](https://doi.org/10.3389/fpsyg.2019.00305).
- [21] Kuts, T., & Makarchuk, O. (2023). *Environmental awareness of students of national university of life and environmental sciences (NULES) of Ukraine in the context of modern challenges*. *Scientific Papers Series Management, Economic Engineering in Agriculture & Rural Development*, 23(2), 363-370.
- [22] Mahanta, B., & Sarkar, B. (2023). Environmental awareness among higher education students. *International Journal for Multidisciplinary Research*, 5(5). doi: [10.36948/ijfmr.2023.v05i05.7040](https://doi.org/10.36948/ijfmr.2023.v05i05.7040).
- [23] Manolis, E.N., & Manoli, E.N. (2021). Raising awareness of the sustainable development goals through ecological projects in higher education. *Journal of Cleaner Production*, 279, article number 123614. doi: [10.1016/j.jclepro.2020.123614](https://doi.org/10.1016/j.jclepro.2020.123614).
- [24] Martzoukou, K., Fulton, C., Kostagiolas, P., & Lavranos, C. (2020). A study of higher education students' self-perceived digital competences for learning and everyday life online participation. *Journal of Documentation*, 76(6), 1413-1458. doi: [10.1108/JD-03-2020-0041](https://doi.org/10.1108/JD-03-2020-0041).
- [25] Mofatteh, M. (2020). Risk factors associated with stress, anxiety, and depression among university undergraduate students. *AIMS Public Health*, 8(1), 36-65. doi: [10.3934/publichealth.2021004](https://doi.org/10.3934/publichealth.2021004).
- [26] Nahirniak, T.B. (2022). The relevance of environmental education and raising the environmental awareness of citizens in the conditions of martial law in Ukraine. *Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies. Series: Agricultural Sciences*, 24(97), 128-131. doi: [10.32718/nvlvet-a9722](https://doi.org/10.32718/nvlvet-a9722).
- [27] Oliveira, G., Grenha Teixeira, J., Torres, A., & Morais, C. (2021). An exploratory study on the emergency remote education experience of higher education students and teachers during the COVID-19 pandemic. *British Journal of Educational Technology*, 52(4), 1357-1376. doi: [10.1111/bjet.13112](https://doi.org/10.1111/bjet.13112).
- [28] Order of the Ministry of Education and Science of Ukraine No. 1076 “On Approval of the Higher Education Standard for Specialty 101 “Ecology” for the First (Bachelor) Level of Higher Education”. (2018, October). Retrieved from <https://surl.li/ktzxve>.

- [29] Order of the Ministry of Education and Science of Ukraine No. 96 “On Approval of Higher Education Standards”. (2024, January). Retrieved from <https://mon.gov.ua/static-objects/mon/sites/1/vishcha-osvita/zatverdzeni%20standarty/2024/Nakaz-96.vid.26.01.2024.pdf>.
- [30] Organisation for Economic Co-operation and Development. (2025). *Civic education as a pathway to inclusive societies*. Paris: OECD.
- [31] Rasul, T., Nair, S., Kalendra, D., Robin, M., de Oliveira Santini, F., Ladeira, W., Sun, M., Day, I., Rather, R.A., & Heathcote, L. (2023). The role of ChatGPT in higher education: Benefits, challenges, and future research directions. *Journal of Applied Learning & Teaching*, 6(1), 41-56. doi: 10.37074/jalt.2023.6.1.29.
- [32] Rawas, S. (2023). ChatGPT: Empowering lifelong learning in the digital age of higher education. *Education and Information Technologies*, 29(6), 6895-6908. doi: 10.1007/s10639-023-12114-8.
- [33] Sá, M.J., & Serpa, S. (2020). The COVID-19 pandemic as an opportunity to foster the sustainable development of teaching in higher education. *Sustainability*, 12(20), article number 8525. doi: 10.3390/su12208525.
- [34] Santos, G., Marques, C.S., Justino, E., & Mendes, L. (2020). Understanding social responsibility's influence on service quality and student satisfaction in higher education. *Journal of Cleaner Production*, 256, article number 120597. doi: 10.1016/j.jclepro.2020.120597.
- [35] Sanusi, I.T., Oyelere, S.S., & Omidiora, J.O. (2022). Exploring teachers' preconceptions of teaching machine learning in high school: A preliminary insight from Africa. *Computers and Education Open*, 3, article number 100072. doi: 10.1016/j.caeo.2021.100072.
- [36] Shri, G.U., & Tiwari, R.R. (2021). Environmental literacy among college students. *Indian Journal of Occupational and Environmental Medicine*, 25(3), 128-132. doi: 10.4103/ijoom.IJOEM_141_20.
- [37] Southworth, J., Migliaccio, K., Glover, J., Glover, J., Reed, D., McCarty, C., Brendemuhl, J., & Thomas, A. (2023). Developing a model for AI Across the curriculum: Transforming the higher education landscape via innovation in AI literacy. *Computers and Education: Artificial Intelligence*, 4, article number 100127. doi: 10.1016/j.caeai.2023.100127.
- [38] Toquero, C.M. (2020). Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. *Pedagogical Research*, 5(4), article number em0063. doi: 10.29333/pr/7947.
- [39] United Nations Office for Disaster Risk Reduction. (2021). *Global assessment report on disaster risk reduction 2021*. Geneva: UN Office for Disaster Risk Reduction.
- [40] Vilcapoma-Malpartida, P.-M., Vilcañaupa-Toralava, G.-M., Huamán-Romani, Y.-L., Aragón-Navarrete, R.-N., Huaraca-Aparco, R., & Machaca-Mamani, J.-C. (2023). Perspectives of environmental awareness in university students. *Human Review: International Humanities Review*, 21(1), 201-213. doi: 10.37467/revhuman.v21.5048.
- [41] Villarreal Arroyo, Y.P., Peñabaena-Niebles, R., & Berdugo Correa, C. (2023). Influence of environmental conditions on students' learning processes: A systematic review. *Building and Environment*, 231, article number 110051. doi: 10.1016/j.buildenv.2023.110051.
- [42] Zinchenko, V.V., Boichenko, M.I., & Popovych, M.D. (2021). Higher education and sustainable development promotion: International potential and its elaboration in Ukraine. *IOP Conference Series: Earth and Environmental Science*, 635, article number 012012. doi: 10.1088/1755-1315/635/1/012012.

Юрій Полукаров

Кандидат технічних наук, доцент

Національний технічний університет України «Київський політехнічний інститут імені Ігоря Сікорського»

03056, просп. Берестейський, 37, м. Київ, Україна

<https://orcid.org/0000-0002-6261-3991>

Олексій Полукаров

Кандидат технічних наук, доцент

Національний технічний університет України «Київський політехнічний інститут імені Ігоря Сікорського»

03056, просп. Берестейський, 37, м. Київ, Україна

<https://orcid.org/0000-0003-4260-0330>

Підвищення обізнаності про екологічну безпеку серед здобувачів вищої освіти

Анотація. Метою дослідження було здійснити аналіз навчальних планів та курсів з патріотичною складовою для підвищення обізнаності студентів про екологічну безпеку. Методологія дослідження включала теоретичний аналіз навчальних програм, контент-аналіз потенційних ризиків на небезпечних об'єктах та розробку рекомендацій щодо вдосконалення змісту навчальних програм. Навчальні програми забезпечували формування у студентів знань про екологічну безпеку, громадянську та патріотичну свідомість, поєднуючи теоретичні знання з практичними навичками реагування на надзвичайні ситуації. Разом із тим виявлено недостатню інтеграцію міждисциплінарних та практичних модулів, що обмежувало розвиток критичного мислення, активної громадянської позиції та застосування знань у реальному професійному та соціальному контексті. Контент-аналіз виявив, що навчальні матеріали і нормативні документи систематизують потенційні загрози, класифікують їх за типами та рівнем небезпеки, що дозволяло студентам формувати первинне уявлення про ризики та оцінювати їхній вплив на навчальний процес. Рекомендації щодо вдосконалення навчальних дисциплін передбачають оновлення змісту програм із включенням патріотичної та громадянської складових, посилення міждисциплінарних зв'язків, розробку нових модулів і спецкурсів, інтеграцію сучасних цифрових технологій та штучного інтелекту для аналізу екологічних даних, удосконалення критеріїв оцінювання громадянських компетентностей і розширення партнерства закладів освіти з громадськими інституціями. Реалізація цих змін спрямована на формування у студентів цілісного розуміння ролі фахівця в суспільстві, підвищення мотивації до збереження національної ідентичності, розвиток екологічної відповідальності, критичного мислення та громадянської активності як складових професійної підготовки. Практичне значення роботи полягає в тому, що її результати можуть використовувати викладачі дисциплін з екологічної безпеки та цивільного захисту для розробки навчальних програм і практичних занять із моделювання ризиків на небезпечних об'єктах

Ключові слова: студенти; викладачі; заходи захисту; цивільний захист; надзвичайні ситуації

**Iryna Kamenska***

PhD in Agricultural Sciences, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0003-2872-5065>

Nataliia Redziuk

PhD, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0002-8697-349X>

Mykhailo Boiko

PhD in Historical Sciences, Lecturer
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0003-4326-2564>

Competence-oriented learning as a contemporary didactic paradigm in pedagogical science

Abstract. This study aimed to reveal the theoretical foundations, didactic principles and mechanisms for implementing the competence-based approach in the educational process. The research methodology was based on the consistent application of theoretical, comparative, functional and critical analysis, systematisation, theoretical synthesis and modelling. These methods were used to clarify the conceptual framework of the competence-based approach, define its didactic principles and methodological foundations, and identify mechanisms for its implementation in the educational process. The use of these methods ensured a coherent examination of the theoretical, methodological and practical aspects of the competence-based approach and made it possible to describe it as an integrated system. The study established that the competence-based approach changes the logic of the educational process by redirecting learning outcomes towards the capacity for action. A distinction was made between “competence” as a normatively defined requirement and “competency” as an actual educational outcome, manifested in the ability to apply knowledge, skills and experience in specific situations. It was found that the structure of competency is integrative and includes cognitive, operational, value-motivational components and practical experience, which function in interconnection. The study determined that the difference between the competence-based approach and the knowledge-based model lies in the changing function of knowledge, which is regarded as a means of action. The principles of competence-oriented learning were specified, including orientation towards learning outcomes, an activity-based character, integrative content, contextuality, learner agency and reflexivity. It was established that the coordinated application of these principles ensures the development of the ability to perform practical and professionally oriented tasks. The methodological foundations of the approach are outlined through the integration of activity-based, learner-centred and systemic approaches, as well as constructivist ideas of learning. It is shown that the implementation of competence-based learning is accompanied by a change in the role of the teacher, the use of active teaching methods and the introduction of assessment focused on the learner’s activity. The practical significance of the study lies in the possibility of using the findings to design educational programmes, select teaching methods and develop assessment systems aimed at the formation of competencies

Keywords: educational process; learner; integrative content; contextuality; educational outcome

Suggested Citation:

Kamenska, I., Redziuk, N., & Boiko, M. (2026). Competence-oriented learning as a contemporary didactic paradigm in pedagogical science. *Scientia et Societatis*, 5(1), 42-55. doi: 10.69587/ss/1.2026.42.

*Corresponding author (ikamenskay1@gmail.com)



INTRODUCTION

The relevance of the study is determined by the fact that competence-oriented learning changes the logic of organising the educational process: the outcome of learning is not only the acquisition of educational material, but also the ability to apply knowledge, skills and experience in specific educational, professional and social situations. For pedagogical science, this issue is of fundamental importance, since the competence-based approach influences the content of education, the selection of teaching methods, the design of educational programmes and the assessment system. Its study makes it possible to define more precisely what outcomes modern education should provide and which didactic means can be used to develop them. The research problem is connected with the need to explain how the competence-based approach functions not merely as an educational requirement, but as an integrated didactic model. This ensures the consistent use of the concept of “competency” in curricula and methodological documents in accordance with its didactic content. The study of this topic makes it possible to establish how the principles of competence-based learning should be linked to the content of education, learners’ activity, the role of the teacher and assessment criteria. Particular importance is attached to defining the methodological foundations of such learning, as these provide its scientific validity and practical consistency.

In pedagogical literature, the competence-based approach is considered a theoretical basis for renewing education, a tool for designing learning outcomes and a mechanism for restructuring the educational process. In this context, O. Polinkevych *et al.* (2026) linked the competence-based model to the formation of sustainable educational and economic ecosystems. Their study showed that the quality of education acquires practical significance when the competencies developed ensure learners’ adaptability to environmental changes and can be correlated with long-term socio-economic outcomes. This understanding of competency as a practically significant learning outcome is complemented by studies that shift attention to the internal structure of educational training. In particular, the connection between the competence-based approach and the development of soft skills was examined in the research of N. Diachenko & A. Usatyi (2021). The authors concluded that communication, critical thinking, self-regulation and the ability to interact cannot be treated as secondary elements of the educational process, since these qualities ensure the functionality of knowledge in real situations. Further clarification of this logic is connected with defining the conceptual framework itself. A systematic interpretation of the main categories of the competencebased approach was proposed by N. Mukan *et al.* (2023). In their interpretation, competency appears as an integrative characteristic that combines knowledge, skills, practical experience and the ability to apply them. This conclusion is important for didactics, as it makes it possible not to reduce learning outcomes to separate areas of knowledge or individual skills, but to consider them as an integrated formation.

While the theoretical understanding of competency defines the substantive basis of the approach, its implementation requires methodological coherence. This aspect was specified in the study of Y. Romanyshyn & I. Briukhovetska (2024), which showed that the effectiveness of the competence-based model depends on the alignment between educational standards, learning content, teaching methods and the assessment system. The authors established that, without clear methodological guidelines, the competence-based approach risks remaining declarative, since changes in curricula are not always accompanied by changes in pedagogical practice. This problem is clearly evident in sector-specific educational contexts. The significance of innovative approaches in higher education was examined by L. Nikitchenko *et al.* (2024). The study established that active and interactive methods contribute to the transition from reproductive acquisition of material to activity-based processing of knowledge.

The alignment between learner activity, learning content and assessment is directly connected with the problem of formulating learning outcomes. This aspect was substantiated by A. Vitchenko *et al.* (2022), who demonstrated the importance of learning outcomes as a central element of the competence-based approach. Clearly defined learning outcomes ensure a connection between the aims of an educational programme, learning content and assessment criteria. In professional education, this problem acquires additional importance, since competencies must correspond to the specific nature of future professional activity. The theoretical justification of modern models for training future IT specialists was presented by R. Diadiushkin (2025). The study showed that educational programmes should be flexible and capable of responding to changing professional requirements. This conclusion confirms that the competence-based approach serves as the basis for adaptive professional training, in which learning content is aligned with real working conditions. A similar logic can also be observed in teacher training.

The specific features of developing the professional readiness of future masters of primary education were examined by O. Blyznyuk (2025). The study emphasised that pedagogical mastery is formed through a combination of theoretical training, practical experience and the ability to act in educational situations. This logic is completed by the anthropological dimension of competence-based learning, since any educational model is implemented through the development of a particular individual. The significance of the anthropological approach in modern education was substantiated by L. Holubnychyha *et al.* (2023). The authors showed that taking into account the individual characteristics of learners improves learning effectiveness and is consistent with the personal orientation of the competence-based approach. In this understanding, the formation of competencies involves not only the organisation of learning activity, but also consideration of the subjective experience, needs and capacities of participants in the

educational process. Despite the considerable number of studies, the competence-based approach has often been considered fragmentarily: separately as a theoretical model, a methodological basis or a practical tool. As a result, its holistic functioning as a didactic paradigm, in which principles, methodology and implementation mechanisms must be mutually aligned, has remained insufficiently explored. This article aimed to determine the substantive, methodological and didactic characteristics of the competence-based approach in the organisation of the educational process.

MATERIALS AND METHODS

The research methodology was organised into several logically connected stages, each corresponding to a separate aspect of the analysis of competence-oriented learning. This structure made it possible to move consistently from clarifying the conceptual framework to defining the principles, methodological foundations and practical mechanisms for implementing the competence-based approach in the educational process. At the stage of theoretical and conceptual analysis of the competence-based approach, the method of theoretical analysis was applied. This made it possible to clarify the meaning of the concepts of “competence” and “competency”, their relationship and their functional significance within the structure of the educational outcome. The analysis included the research of T. Açıkgöz & M.C. Babadoğan (2021), which examines the theoretical foundations of competency-based education, as well as the studies by K.M. Marcotte & L.D. Gruppen (2022) and D. Matinho *et al.* (2022), which were used to substantiate the structure of competency as an integrative learning outcome. Comparative analysis was used when comparing the competence-based approach with the knowledge-based model of learning. Its application made it possible to identify the differences between these models in terms of educational content, the role of the teacher, the position of the learner and the nature of learning activity. For this purpose, the provisions of T. Açıkgöz & M.C. Babadoğan (2021) concerning the practical orientation of competence-based education were used, along with the study of J. Cindrić *et al.* (2024), which examines the knowledge-oriented logic of learning.

The method of systematisation was applied to determine the didactic principles of competence-oriented learning. It made it possible to organise the principles according to their functional purpose and to trace the connection between orientation towards learning outcomes, the activity-based nature of learning, integrative content, contextuality, learner agency and reflexivity. The selection of these principles was based on the criteria of their correspondence to the structure of competency and their focus on developing the capacity for action. The principle of orientation towards learning outcomes was substantiated with reference to J. Hao (2024), the activity-based nature of learning with reference to D. Behera *et al.* (2024), and contextuality, learner agency and reflexivity, presented in Table 1, on the basis of A. Seguel-Arriagada *et al.* (2025) and A.S. Aschoff (2026). At the stage of substantiating the methodological foundations

of competence-oriented learning, the method of theoretical synthesis was used. It ensured the integration of activity-based, learner-centred and systemic approaches, as well as constructivist ideas of learning, into a single explanatory framework. The methodological provisions summarised in Table 2 were developed on the basis of the studies of S.J. Alainati (2021), L. Holubnycha *et al.* (2022) and D. DeBacker *et al.* (2024), in which competence-based learning is considered as a multi-level model for organising the educational process. In describing the practical mechanisms for implementing the competence-based approach, the method of modelling was applied. This method made it possible to reproduce the interrelationship between the teacher, the learner, learning content, teaching methods and assessment.

The change in the teacher's role was modelled with reference to D.H. Rhoney *et al.* (2024). The terminology and functional distribution of the teacher's roles were determined through a functional analysis of the pedagogical actions required for designing tasks, supporting learners' activity, providing feedback and assisting in the assessment of competencies. The methods of competence-oriented learning were described on the basis of E. Polz & S. Bećirović (2022), while the assessment component was developed with reference to the provisions of C.F. Wei & P. Lii (2022). At the stage of identifying the limitations of implementing the competence-based approach, the method of critical analysis was used. This made it possible to consider the overloading of educational programmes, the inertia of pedagogical thinking and the insufficient development of assessment tools as factors that disrupt the alignment between learning outcomes, content, activity and assessment procedures. For this purpose, the studies of C.F. Wei & P. Lii (2022), D. DeBacker *et al.* (2024) and D.H. Rhoney *et al.* (2024) were used. The application of these methods ensured a consistent study of the theoretical and methodological foundations of the competence-based approach, as well as the identification of the principles and possibilities for its implementation in the educational process.

RESULTS

Theoretical foundations of the formation of the competence-based approach in education

The competence-based approach in pedagogy is formed through a reconsideration of the aims, content and outcomes of learning. It is based on an orientation towards the learner's ability to apply knowledge, skills and experience in educational, professional and social situations. The theoretical substantiation of this approach includes the distinction between its basic concepts, the definition of the structure of competency and the identification of its differences from the knowledge-based model of learning. A theoretical understanding of the competence-based approach first requires clarification of its basic concepts, since these concepts define the content of educational outcomes and the logic of their formation.

The concepts of “competence” and “competency” are not identical, although in educational practice they are

often used as closely related terms. Competence has a normative character and denotes a prescribed requirement for the training of a learner. It is fixed in educational standards, curricula and qualification profiles, and defines the range of knowledge, skills, functions and powers required for a particular activity. Competency characterises an actual educational outcome. It is manifested in a person's ability to apply acquired knowledge and skills in specific conditions, make decisions, and act independently and responsibly. While competence sets the expected level of training, competency shows the extent to which this level has been formed in the learning process. This distinction is important for designing the educational process. Competences define the reference points of learning, whereas competencies serve as the outcomes that must be developed and assessed. Therefore, assessment within the competence-based approach cannot be limited to checking acquired information. It must record the learner's ability to act in situations that require the application of knowledge, the choice of a course of action and the justification of a decision (Açıkgöz & Babadoğan, 2021). The distinction between these concepts provides a basis for further consideration of the internal structure of competency, since its content is not limited to normatively prescribed training requirements.

The structure of competency is defined as a set of interrelated components that ensure the integrity of the educational outcome. It includes knowledge as the substantive basis of activity; abilities and skills as means of performing it; motivational and value orientations as internal conditions for activity; and practical experience, which is formed through the application of acquired knowledge and skills in various situations. The structural model of competency was developed on the basis of the systematisation of approaches to its interpretation in the analysed scholarly sources. In the course of the analysis, recurring substantive features of competency were identified, related to knowledge, skills, motivational and value orientations, and experience of practical application. These features were grouped according to their function in the educational outcome: the cognitive component defined the substantive basis of activity; the operational component, the ways of performing it; the value-motivational component, its internal orientation; and practical experience, the ability to apply what has been acquired in specific situations. This provided grounds for presenting competency as an integrative formation in which individual components function in interconnection. The coordinated functioning of these components ensures the ability to act effectively in educational and professional contexts (Fig. 1).

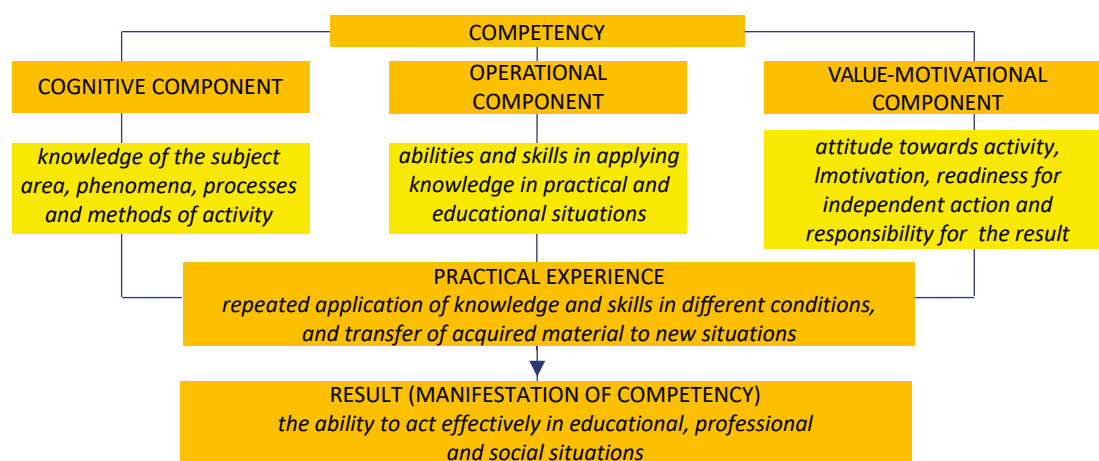


Figure 1. Structure of competency as an integrative learning outcome

Source: compiled by the authors based on K.M. Marcotte & L.D. Gruppen (2022), D. Matinho *et al.* (2022)

The structural model presented made it possible to establish that competency had formed as an integrated construct in which individual components acquired functional interdependence. It was found that the learning outcome was determined not by the presence of isolated elements, but by the degree of their integration and their ability to ensure coordinated activity. The identified interaction between the components confirmed that the formation of competency required the organisation of the learning process in a way that combined content, activity and personal factors. This provided grounds for considering competency as an outcome that reflected the level of development of the capacity for action, rather than merely

the amount of material acquired. Clarifying the structure of competency makes it possible to proceed to a comparison of the competence-based approach with the knowledge-based model of learning, since it is the complexity of the educational outcome that determines the difference between these approaches.

The knowledge-based model of learning is oriented mainly towards the acquisition and reproduction of educational information. Its outcome is the amount of knowledge possessed by the learner, while the effectiveness of learning is often determined by the correctness of answers and the accuracy with which material is reproduced. In this model, explanatory-illustrative and reproductive

methods of learning predominate. The competence-based approach changes this logic. Knowledge remains a necessary basis of learning, but its role is determined by its ability to support practical action. The learning outcome is assessed not only by what the learner knows, but also by how this knowledge is used to solve tasks, explain situations, make decisions and interact with other participants in the educational process. The difference between these models is also reflected in the construction of educational content. In the knowledge-based model, content is often presented as a system of topics, concepts and facts that must be acquired. In the competence-based approach, content is selected with regard to its function in developing the capacity for action. Educational material should not only convey information, but also provide a basis for completing practical, problem-based and research tasks. The role of the teacher also changes. In the knowledge-based model, the teacher mainly acts as a source of information and a controller of its acquisition. In the competence-based approach, the teacher organises learning activity, selects tasks, creates conditions for the independent search for solutions, provides feedback and guides learners' reflection (Cindrić *et al.*, 2024). The position of the learner also changes. The learner is not limited to receiving and reproducing material, but participates in activities that require analysis, choice, the application of knowledge and evaluation of their own actions. For this reason, competence-based learning involves active forms of work: problem-based tasks, projects, case studies, discussions, and the modelling of educational or professional situations.

The theoretical foundations of the competence-based approach were revealed through the interpretation of education as a process of developing the capacity for meaningful activity. Competence was defined as a normatively prescribed requirement for training, while competency was defined as a formed outcome manifested in the practical application of knowledge, skills, attitudes and experience. This made it possible to consider competency as an integrated system of interrelated components. The difference between the competence-based approach and the knowledge-based model was established through a change in the logic of the educational outcome: the leading focus became not the reproduction of information, but the ability to use it in specific educational, professional and social situations. This position led to a different understanding of educational content, the organisation of learning activity and assessment. Further substantiation of competence-oriented learning required the identification of principles that ensured its didactic consistency and practical implementation.

Didactic principles for the implementation of competence-oriented learning

Competence-oriented learning is defined as a system in which educational content, the organisation of activity and the assessment of outcomes are subordinated to the formation of the ability to act in different situations. Its

implementation is determined by a set of principles that define the logic of constructing the educational process and ensure the coherence of its components. These principles reflect the relationship between learning aims, the ways in which they are achieved and the characteristics of the educational outcome. Orientation towards learning outcomes involved constructing the educational process from the expected outcome to the content, methods and assessment criteria. Within the competence-based approach, it was appropriate to formulate the outcome not as the acquisition of a particular topic, but as the ability to perform a specific action using knowledge. For example, instead of the formulation "to know the methods of pedagogical diagnosis", the outcome should be presented as "to be able to select methods of pedagogical diagnosis according to the age of learners, the purpose of observation and the conditions of the learning situation". In this case, the learning outcome immediately specified not only the content of training, but also the expected mode of action.

A clear definition of learning outcomes made it possible to connect three components of the educational process: what exactly had to be formed, through which learning actions this was achieved and by which criteria the result could be assessed. If the outcome involved the ability to analyse a pedagogical situation, the learning content had to include not only theoretical provisions, but also case studies, observations and comparisons of possible solutions. In this case, assessment could not be limited to testing knowledge of concepts, since it was necessary to determine whether the learner was genuinely able to apply knowledge to solve a specific task. The practical significance of this principle was evident in the fact that learning outcomes became the basis for selecting tasks. For example, in the training of a future teacher, the outcome "the ability to plan a lesson fragment with regard to pupils' age-specific characteristics" required a task involving the development of a lesson plan, justification of the choice of methods and identification of the expected outcomes for pupils. In such a situation, the level of competency development was determined not by the number of theoretical provisions reproduced, but by the quality of the pedagogical decision and its correspondence to the aim, conditions and pupils' needs (Hao, 2024). Thus, orientation towards learning outcomes ensured a transition from describing educational material to describing the expected activity of the learner. It set the logic for designing the educational process, in which content, methods and assessment were subordinated to the development of a specific capacity for action. For this reason, this principle was directly linked to the activity-based nature of competence-oriented learning.

The activity-based nature of learning determined the organisation of the educational process through learners' performance of specific learning actions: analysing information, solving problem-based tasks, preparing projects, modelling situations and justifying decisions. In such a system, knowledge was not transmitted as ready-made

material to be memorised, but was acquired through its use in practical and learning-cognitive tasks. Learning activity required the active participation of the learner, who not only reproduced the content of the topic, but also applied it to explain phenomena, compare approaches, choose a course of action and evaluate the result. For example, in teacher training, this could be reflected in the development of a lesson fragment, the analysis of a learning situation, the selection of methods for working with a group or the justification of a pedagogical decision. This format ensured the development of skills in working with information, making decisions, cooperating with others and taking responsibility for the outcome of the work performed. The organisation of learning as activity required the selection of content in which educational material was linked to tasks, situations and modes of action. This ensured the integration of knowledge and promoted its use in various educational, professional and social contexts.

The integrative nature of educational content lies in combining knowledge from different fields and orienting it towards the formation of a holistic understanding of objects and phenomena. Learning content was constructed not as a set of isolated topics, but as a system in which individual elements were connected through common tasks, problems or areas of activity. This approach made it possible to avoid fragmented knowledge and ensured its functionality. Integration contributed to the development of the ability to transfer knowledge from one field to another,

which became a necessary condition for solving complex tasks. At the same time, it created the preconditions for the development of systems thinking, as the learner learned to establish links between different aspects of the phenomenon under study. The integrative nature of content was directly connected with the contextuality of learning, since it was through context that knowledge acquired applied significance (Behera *et al.*, 2024). At the same time, the activity-based organisation of learning did not fully account for the mechanism of competency formation, since completing a task required meaningful processing of the experience gained. From the standpoint of the constructivist approach, the learner not only applied ready-made knowledge, but also related new information to prior experience, clarified their own understanding of the problem, tested the chosen course of action and adjusted it on the basis of the task outcome. This made it possible to explain why competency was formed not only through activity, but also through the independent construction of knowledge in the process of learning activity. Contextuality, learner agency and reflexivity specify the procedural dimension of competence-oriented learning. They define the conditions under which knowledge is transformed into practical action, the learner assumes an active position, and learning outcomes become the subject of reflection and correction. These principles ensure the connection between the learning situation, independent activity and the assessment of one's own experience (Table 1).

Table 1. Contextuality, learner agency and reflexivity in competence-based learning

Principle	Content of the principle	Implementation in the educational process	Expected result
Contextuality of learning	Learning was linked to real or near-real situations in which knowledge could be applied	Learning tasks were formulated through professional, social or educational situations that required analysis, selection of a course of action and assessment of the consequences of a decision	A connection was ensured between theoretical material and practice, and the knowledge acquired applied significance for the learner
Learner agency	The learner was considered an active participant in learning who independently made decisions, chose ways of completing tasks and assessed the results	The teacher organised the educational environment, created conditions for independent activity, supported the choice of an individual trajectory and provided feedback	Experience of independent work, responsibility for the result, and the ability to plan, self-regulate and adjust one's own actions were developed
Reflexivity of learning activity	Learning was directed towards understanding one's own actions, results, mistakes and ways of further improvement	Self-assessment, peer assessment, discussion of activity results, learning journals and reflective questions after completing tasks were used	The ability to exercise selfcontrol, understand the learning process and identify directions for further competency development was developed

Source: compiled by the authors based on A. Seguel-Arriagada *et al.* (2025), A.S. Aschoff (2026)

The generalisation of these provisions made it possible to establish that contextuality, learner agency and reflexivity functioned as interrelated mechanisms that ensured the transition from the acquisition of knowledge to its conscious use. Context set the conditions for application, the learner's active position determined the way in which the learner was involved in the activity, and reflection ensured understanding of the experience gained and its further correction. Their combination formed a complete cycle of learning activity in

which the result was not only achieved, but also assessed in terms of the possibility of further development. The principles of competence-oriented learning formed an interconnected system that determined the logic of organising the educational process. Orientation towards learning outcomes set the direction of activity; the activity-based nature of learning ensured the formation of experience; integrative content created the integrity of knowledge; contextuality linked knowledge with practice; learner agency defined the

active role of the learner; and reflexivity ensured awareness and correction of learning activity. The coordinated functioning of these principles ensured the formation of competencies, such as the ability to act in different situations. They defined the conditions under which the educational process acquired an integrated character and was directed towards achieving outcomes of practical significance.

The transition from the principles of competence-oriented learning to its methodological foundations is

determined by the need to explain which scientific approaches underlie their implementation. While the principles define the logic of organising the educational process, methodological approaches determine the ways in which it is constructed, explain the mechanisms of competency formation and ensure the theoretical coherence of learning. In this context, the competence-based approach integrates a range of methodological positions, each of which reveals a separate aspect of the educational process (Table 2).

Table 2. Methodological foundations of competence-oriented learning

Methodological approach	Content of the approach	Function in competence-based learning	Manifestation in the educational process
Activity-based approach	Considers learning as a process of organising activity in which knowledge is formed and acquired through its practical application	Ensures the development of skills and practical experience as components of competency	Use of problem-based tasks, case studies, projects and practical situations
Learner-centred approach	Orients learning towards the individual characteristics of the learner, their needs, motives and educational goals	Ensures the development of agency, independence and responsibility	Individualisation of learning tasks, choice of learning trajectory and independent work
Systemic approach	Considers the educational process as an integrated system of interrelated elements: aims, content, methods and assessment	Ensures the coherence of all components of learning and their orientation towards the result	Development of educational programmes based on logically connected learning outcomes
Constructivist ideas of learning	Define knowledge as the result of active construction by the learner on the basis of prior experience	Ensure the development of the capacity for independent cognition and interpretation of knowledge	Organisation of learning through research activity, discussions and analysis of situations

Source: compiled by the author based on L. Holubnycha *et al.* (2022), S.J. Alainati (2021), D. DeBacker *et al.* (2024)

The analytical generalisation of the provisions presented made it possible to establish that competence-oriented learning is formed as a result of the integration of several methodological approaches, each of which performs a specific function. The activity-based approach defined the way in which learning was organised through practical activity; the learner-centred approach ensured that the learner's individual characteristics were taken into account; the systemic approach shaped the integrity of the educational process; and constructivist ideas explained the mechanisms of knowledge acquisition as a result of active cognitive activity. Their combination created the theoretical basis for the coherent functioning of learning content, activity and outcomes.

Practical mechanisms for implementing the competence-based approach in education

The implementation of the competence-based approach in the educational process is determined by changes in the roles of participants in learning, the selection of methods, the organisation of assessment and the conditions in which learning activity takes place. These changes ensure the transition from the reproduction of knowledge to its application, form practical experience and provide a basis for assessing outcomes as the ability to act in specific situations. The change in the teacher's role in competence-oriented learning reflects the transformation of the logic of the educational process, in which the transmission of knowledge gives way to the organisation of learners'

activity. This entails a reorientation of the teacher's functions, the nature of interaction with learners and the expected learning outcomes. The sequence of these changes makes it possible to trace the connection between the teacher's new position, the learner's activity and the formation of the educational outcome (Fig. 2). The diagram showing the change in the teacher's role was developed on the basis of a functional analysis of the characteristics of competence-oriented learning described in the sources. To construct it, the traditional role of the teacher as a source of educational information was compared with the functions required for organising activity-based, contextual and reflective learning. As a result, such teacher functions as designing learning tasks, organising the educational environment, supporting learners' independent activity, providing feedback and supporting reflection were identified. These functions formed the basis of the diagram, which reflects the transition from a transmission-based to a facilitative model of pedagogical interaction. The implementation of the competence-based approach revealed a dependency between the organisation of the learning environment, the learner's activity and the quality of the outcomes formed. The transition to the teacher's facilitative role created conditions for independent work, the choice of modes of action and the gradual accumulation of practical experience. Teaching methods became effective when they were linked to real or simulated situations, while assessment was based on clear criteria and allowed actions to be adjusted. At the same time, it was established

that the competence-based model could not be implemented effectively without revising curricula, providing

methodological training for teachers and developing reliable assessment tools.

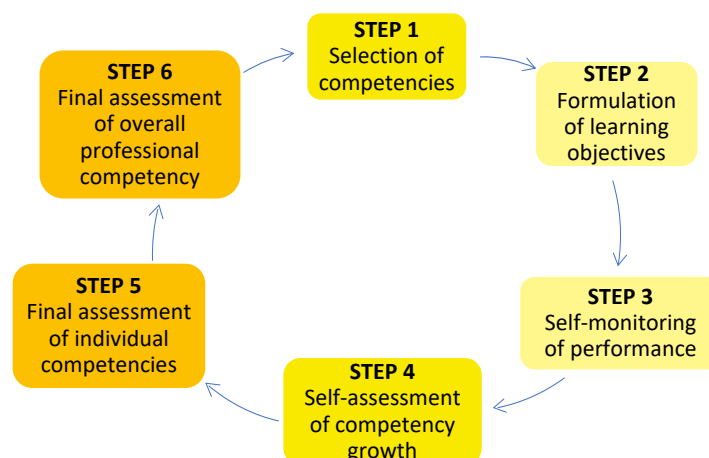


Figure 2. Changing the teacher's role in competence-based learning

Source: compiled by the authors based on D.H. Rhoney *et al.* (2024)

The constructivist dimension of these methods was reflected in the fact that the learner worked not with a ready-made solution, but with a problem-based or variable situation that required independent interpretation. In project-based learning, this was manifested through the gradual clarification of the aim, the selection of information and the construction of the learner's own logic for presenting the result. In the case method, the

constructivist role lies in interpreting the situation, comparing possible solutions and explaining the choice made. In problem-based learning, it was connected with formulating assumptions, testing hypotheses and revising the initial understanding of the problem. As a result, these methods ensured not only the application of knowledge, but also its active reconsideration in the process of activity (Table 3).

Table 3. Methods of competence-oriented learning

Method	Content of the method	Learning activity of learners	Competency-based result
Project-based learning	Completion of a complex task that requires the integration of knowledge from different fields	Setting an aim, planning work, searching for information, analysing data, preparing and presenting the result	Development of professional and general competencies related to work organisation, communication and responsibility
Case method	Work with specific situations close to the real conditions of activity	Identifying the problem, selecting relevant information, evaluating possible solutions and justifying the choice	Development of analytical thinking, decision-making ability and the capacity to act under conditions
Problem-based learning	Creation of learning situations in which there is no ready-made solution	Formulating hypotheses, testing assumptions, comparing approaches and substantiating conclusions	Development of cognitive activity, independence and the ability to search for new knowledge
Discussion	Discussion of a problem-based issue that involves comparing different positions	Formulating arguments, analysing the positions of other participants, substantiating one's own opinion and clarifying conclusions	Development of communicative competency, critical thinking and the ability to defend a decision with reasoned arguments
Modelling of educational or professional situations	Reproduction of conditions close to real educational or professional activity	Performing roles, analysing the conditions of the situation, choosing a course of action and assessing the consequences of the decision made	Formation of the ability to act in variable conditions, make decisions and transfer knowledge into a practical context
Research tasks	Completion of tasks that require independent search, analysis and interpretation of information	Posing a question, selecting sources, analysing data, formulating conclusions and presenting results	Development of research competency, independence, analytical thinking and the ability to work with information

Source: compiled by the authors based on E. Polz & S. Bećirović (2022)

The methods presented form the practical toolkit of competence-based learning, as they shift the educational process into the sphere of action. At the same time, their

competence-based potential is realised only when specific didactic conditions are in place. Project-based learning, the case method and problem-based learning become

means of implementing the competence-based paradigm when tasks are directly aligned with expected learning outcomes, contain a professionally or socially significant context, require an independent choice of a course of action and involve justification of the decision made. An equally important condition is the presence of assessment criteria that record not only the correctness of the answer, but also the learner's ability to analyse a situation, integrate knowledge, act in variable conditions and assess the consequences of their own actions. Under these conditions, active methods cease to be merely a form of organising a class and perform the function of a mechanism for forming competency as an integrated educational outcome. Their effectiveness is determined by the extent to which learning tasks are connected with real conditions for the application of knowledge and whether they allow learners to make decisions independently. This brings into focus the need for an assessment that records not only the correctness of an answer, but also the quality of the activity performed.

Assessment in competence-oriented learning was aimed at determining the level of competency development, which required the use of criteria related to the learner's activity. Assessment was no longer limited to checking knowledge, but included analysis of the ability to perform tasks, justify decisions and apply knowledge in new situations. The assessment criteria were formulated in accordance with the learning outcomes and included indicators reflecting the quality of task performance. The use of rubrics made it possible to specify these criteria in detail, define levels of achievement and ensure transparency in assessment. Learners were able to compare their own results with the established requirements and understand which aspects needed improvement. Formative assessment became part of the learning process and was aimed at supporting learning activity. It included regular feedback, self-assessment and peer assessment. This approach ensured not only the recording of results but also their correction during learning, which contributed to a more conscious acquisition of the material. The change in approaches to assessment revealed a number of difficulties associated with implementing the competence-based approach in educational practice (Wei & Lii, 2022).

The implementation of the competence-based approach is accompanied by limitations that affect the effectiveness of its introduction. These limitations influence not only the organisational level of the educational process, but also the internal coherence of the competence-based model. Their effect is manifested in the gap between declared learning outcomes, the content of educational programmes, the nature of learning tasks and methods of assessment. As a result, the competence based approach can remain at the level of stated aims without leading to a real change in learning activity. One such factor is the overloading of educational programmes, which makes it difficult to integrate activity-based forms of learning. This overloading arises from the continued reliance on the logic of accumulating educational

material, characteristic of the knowledge-based model. Under such conditions, course content remains oriented towards covering the maximum number of topics, rather than selecting material in accordance with the expected learning outcomes. This blocks the competence-based model, as it reduces the time available for practical tasks, analysis of situations, independent search for solutions and reflection. As a result, the learner receives a considerable amount of information, but does not have enough learning situations in which to apply it. The inertia of pedagogical thinking is connected with the established understanding of the teacher's role as the main source of educational information and the controller of its acquisition. This position contradicts the competence-based logic, in which the teacher is expected to organise activity, create conditions for the independent choice of a course of action and provide reflective support.

The preservation of the transmission-based model blocks the formation of the learner's active position, since learning activity remains dependent on explanation, instruction and external control. Teachers require additional training in the use of new methods, the development of tasks and the formulation of assessment criteria. The insufficient development of assessment tools arises from the complexity of competency-based outcomes themselves. Competency includes not only knowledge, but also the ability to act, justify decisions, transfer experience to new situations and evaluate one's own actions. If assessment criteria remain focused mainly on the correctness of an answer or the reproduction of material, they do not make it possible to record the quality of the learner's activity. This blocks the model at the stage of verifying outcomes, since the declared competencies do not receive valid confirmation in the assessment procedure. Determining the level of development of complex educational outcomes requires clear criteria and indicators, which are not always available in ready-made form. This complicates the objectivity of assessment and requires additional efforts to develop appropriate tools. Despite the existing limitations, the competence-based approach demonstrates the possibility of improving the effectiveness of the educational process, provided that its components are used coherently.

The implementation of the competence-based approach determines a change in the logic of organising the educational process, within which the role of the teacher, the nature of learning activity and the methods of assessing outcomes are reconsidered. Teaching methods ensure the formation of practical experience, while the assessment system makes it possible to determine the level of competency development through the completion of practical tasks. At the same time, the effectiveness of implementation depends on overcoming organisational and methodological limitations related to overloaded content, the persistence of traditional approaches and the insufficient development of assessment tools. The alignment of these aspects creates conditions for competence-based learning to function as an integrated didactic model.

DISCUSSION

The obtained results provided grounds for considering competence-oriented learning as a didactic system in which educational content, learning activity and assessment were aligned with the formation of the ability to act in specific educational, professional and social situations. This interpretation corresponds to the conclusions of K. Moldasan *et al.* (2023), in which the competence-based approach was presented as a transition from the acquisition of knowledge to its practical use. In that study, this transition was examined mainly as a general trend in the development of education that changed the orientation of the learning process. In the present study, this position was specified through the internal logic of the didactic model: the distinction between the concepts of “competence” and “competency”, the definition of the structure of competency and the explanation of the functional role of knowledge in activity. As a result, the practical orientation of learning was considered not only as a change in the educational aim, but also as a restructuring of the relationship between aims, content, methods and assessment. In this interpretation, the ability to act was not an additional learning outcome, but an indicator that knowledge, skills, value-motivational orientations and practical experience functioned as an integrated formation.

The proposition concerning the central role of learning outcomes was correlated with the study by P. Thummaphan *et al.* (2022), in which the effectiveness of a competence-based programme was linked to the clear definition of expected outcomes. In that research, this aspect was examined mainly within the development of a school curriculum, that is, as a condition for constructing an educational programme. In the present study, learning outcomes were considered more broadly: as a didactic principle that determined not only the formulation of aims, but also the selection of content, the nature of learning tasks and assessment criteria. This approach made it possible to show that a learning outcome in the competence-based model cannot be presented as the acquisition of a separate topic or a set of concepts. It must record the ability to perform an action using knowledge in a particular context. For this reason, orientation towards learning outcomes was connected with the activity-based nature of the educational process: if the outcome defined the expected action, then learning content and methods had to provide the conditions for its formation, performance and assessment. The problem of the relationship between knowledge and competencies was considered with reference to the findings of B. Fu *et al.* (2025), which substantiated the appropriateness of combining knowledge-based and competence-based logic within outcome-based education. In that study, knowledge and competencies were presented as interrelated frameworks of the educational process that ensured the achievement of defined outcomes. In the present study, this position was detailed through the structure of competency. It was shown that knowledge was neither removed from the educational process nor deprived of

significance; however, its function changed. Knowledge was considered the substantive basis of activity, alongside skills, value-motivational orientations and experience of practical application. This interpretation made it possible to avoid opposing the knowledge-based and competence-based logics. Knowledge served as a necessary condition for the formation of competency, but its educational value was determined by its ability to support task solving, the justification of decisions and the transfer of acquired experience to new situations.

The assessment component of the obtained results was correlated with the conclusions of H. Vargas *et al.* (2024), which emphasised the importance of clear criteria for assessing competencies. In that study, the main attention was focused on the need for transparent indicators that made it possible to relate the completed task to the expected level of competency development. In the present study, this position was extended by considering assessment as part of the learning process, rather than only as a procedure for final verification. Criteria, rubrics and formative assessment were interpreted as tools for recording the quality of task performance, determining levels of outcome achievement and correcting the learner's actions. This approach made it possible to connect assessment with reflection, since the learner was able not only to find out the final result, but also to compare their own actions with the defined requirements, identify difficulties and determine directions for further improvement. The distinction between the concepts of “competence” and “competency” was clarified through comparison with the research of N. Kiesler (2023), in which competency was considered a multidimensional construct that cannot be reduced to a single item of knowledge, skill or behavioural indicator. This position corresponded to the interpretation of competency as a complex integrative characteristic; however, the present study additionally distinguished between the normative and outcome-based levels. Competence was defined as a prescribed requirement for learner training, whereas competency was defined as a formed outcome manifested in the ability to apply knowledge, skills and experience in specific conditions. Owing to this clarification, the conceptual framework was linked to the practice of designing the educational process. Competences set the reference points for content and expected outcomes, while competencies became the object of formation and assessment. This made it possible to explain why assessment in the competence-based model cannot be limited to checking acquired information, but must include the ability to act, justify decisions and apply knowledge in changed situations.

The provisions concerning the changing role of the teacher were compared with the findings of A. Tarmo & A. Kimaro (2021), where competence-based education required a revision of the content of teacher training. In that study, attention was focused on preparing future teachers to work within the competence-based model. In the present study, this problem was examined from the standpoint of the functional organisation of the educational process.

The teacher's role was described through the transition from the transmission of educational information to the organisation of learners' activity. In this model, the teacher acted as an organiser of the educational environment, a coordinator of interaction, a source of feedback and a facilitator of reflection. This clarification was important for understanding the learner's active position, since independence, the choice of a course of action and responsibility for the result could not be developed if an exclusively reproductive model of learning was preserved. Thus, the change in the teacher's role was connected not only with teaching methods, but also with the restructuring of the entire logic of learning interaction. The practical dimension of pedagogical interaction was specified with reference to the study by S. Khan *et al.* (2022), which showed that competence-based learning changes pedagogical behaviour and the nature of interaction between the teacher and learners. In that study, these changes were linked to the outcomes of competence-based training and assessment. In the present study, they were interpreted as a consequence of the general restructuring of the educational process, in which control over the acquisition of material gave way to support for learning activity. This meant that the teacher not only transmitted information or checked its reproduction, but also created conditions for completing tasks, supported the search for solutions, provided feedback and guided reflection. This interpretation made it possible to connect pedagogical behaviour with the didactic principles of competence-based learning: activity orientation, contextuality, learner agency and reflexivity. The change in pedagogical behaviour was therefore considered a mechanism for the transition from a knowledge-based organisation of learning to the formation of competency as the ability to act. The analysis of the activity-based nature of learning was correlated with the conclusions of A. Skulmowski (2024), which emphasised that the active performance of actions alone does not guarantee a learning outcome. This position was important for clarifying the limits of the activity-based approach within the competencebased model. The present study showed that the effectiveness of activity-based learning was determined not by the number of practical tasks, but by their alignment with expected outcomes, content integration, the presence of a context for applying knowledge and the possibility of reflective understanding of the actions performed. For this reason, projects, case studies, problem-based tasks, discussions, situation modelling and research tasks were considered not as self-sufficient methods, but as tools for forming competency, provided that they were aligned with learning outcomes and assessment criteria. This position made it possible to clarify that activity acquires competence-based significance only when it ensures the application of knowledge, the choice of a course of action, the justification of a decision and the analysis of the result obtained.

The comparison of the results showed that the provisions of this study were consistent with existing works, but differed in the way they were theoretically organised.

In the studies reviewed, the competence-based approach was usually revealed through separate aspects: curriculum renewal, formulation of learning outcomes, assessment, changes in the teacher's role or the use of activitybased methods. In the present study, these components were combined into a single logic, in which no element functioned in isolation, but each determined the conditions for the implementation of the others. It was established that competence-oriented learning was not limited to the introduction of active methods or the revision of assessment criteria. Its integrity was ensured by the interconnection between the theoretical understanding of competency, methodological approaches, didactic principles and practical mechanisms of implementation. This made it possible to refine the findings of previous studies: separate conclusions concerning curriculum design, outcome-based education, assessment frameworks, pedagogical behaviour and activity-based learning were integrated into a broader didactic model. The distinction of the obtained results lay in the level of generalisation. While previous studies mainly identified separate regularities in the implementation of the competence-based approach, the present study demonstrated their interdependence. This made it possible to consider competence-oriented learning as a system in which the learning outcome determined the content, the content shaped the nature of activity, activity required appropriate methods, and assessment ensured the recording and correction of the competencies formed. This provided a basis for summarising the main results of the study, defining its theoretical contribution and practical significance, and outlining further directions for scholarly inquiry.

CONCLUSIONS

The theoretical study established that the competence-based approach has developed as a systemic didactic paradigm based on the reorientation of educational outcomes from the acquisition of knowledge to the formation of the ability to apply it in different situations. The theoretical and methodological foundations of this approach were revealed through the clarification of basic concepts, the structure of competency and its functional purpose in the educational process. It was determined that the distinction between the concepts of "competence" and "competency" ensured clarity in the design of learning outcomes: competence functioned as a normative requirement, whereas competency reflected the actual level of their achievement. The structure of competency was interpreted as an integrative formation that combined knowledge, skills, value-motivational orientations and practical experience. It was found that the effectiveness of learning was determined not by separate components, but by the level of their interaction, which ensured the capacity for integrated activity. It was established that this interpretation of the learning outcome led to a change in the logic of the educational process, in which knowledge acquired functional significance as a means of action rather than as an independent aim. This made it possible to determine the difference between

the competence-based approach and the knowledge-based model, which was oriented mainly towards the reproduction of information. The identification of the principles of competence-oriented learning made it possible to specify the conditions for its implementation. It was established that orientation towards learning outcomes ensured the connection between aims, content and assessment; the activity-based nature of learning formed the basis for acquiring practical experience; and the integrative nature of content made it possible to overcome fragmented knowledge. At the same time, contextuality, learner agency and reflexivity ensured the learner's involvement in the learning process as an active participant capable of making independent decisions and evaluating their own activity.

The analysis of the possibilities for implementing the competence-based approach showed that its introduction was accompanied by changes in the teacher's role, with the teacher performing the function of organiser of the educational environment and coordinator of activity. It was established that the use of project-based, problem-based and case-oriented learning ensured the formation of experience in applying knowledge in practical situations. The assessment system acquired a procedural character, which made it possible to record not only the final result, but also the dynamics of competency formation through the use of criteria, rubrics and formative assessment. At the same time, it was found that the effectiveness of competence-oriented learning depended on a number of conditions, among which the most important were the alignment of educational content with learning outcomes, teachers' readiness to use activity-based methods and the availability of valid

assessment tools. Limitations associated with the overloading of curricula, the inertia of pedagogical thinking and the insufficient development of assessment procedures complicated the full implementation of the approach. The obtained results showed that competence-oriented learning functions as an integrated system in which theoretical foundations, didactic principles and practical mechanisms of implementation are interrelated. This made it possible to consider it an effective model for organising the educational process, aimed at developing the capacity for activity in a changing social and professional environment. The limitations of the study are determined by its theoretical nature, which does not involve empirical verification of the obtained provisions, as well as by its dependence on the representativeness of the analysed sources and the variability of interpretations of the competencebased approach in pedagogical literature. Prospects for further research are connected with the empirical verification of the effectiveness of competence-oriented learning, the development of valid tools for assessing the formation of competencies and the clarification of models for their implementation in different educational contexts.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Açıkgöz, T., & Babadoğan, M.C. (2021). Competency-based education: Theory and practice. *Psycho-Educational Research Reviews*, 10(3), 67-95. [doi: 10.52963/PERR_Biruni_V10.N3.06](https://doi.org/10.52963/PERR_Biruni_V10.N3.06).
- [2] Alainati, S.J. (2021). Towards an effective competency-based education and training model. *IOSR Journal of Business and Management (IOSR-JBM)*, 23(11), 31-40. [doi: 10.9790/487X-2311013140](https://doi.org/10.9790/487X-2311013140).
- [3] Aschoff, A.S. (2026). Lived experiences of teachers during their career transitions from beginning teachers to highly proficient teachers. *International Journal of Open-access, Interdisciplinary & New Educational Discoveries of ETCOR Educational Research Center*, 4(1), 402-421. [doi: 10.63498/nxz2st238](https://doi.org/10.63498/nxz2st238).
- [4] Behera, D., Khuntia, A., & Kar, B. (2024). Enhancing educational outcomes through activity-based learning: A comprehensive review. *International Research Journal of Humanities and Interdisciplinary Studies*, 5(4), 337-344. [doi: 10.2024-38648169/IRJHIS2404039](https://doi.org/10.2024-38648169/IRJHIS2404039).
- [5] Blyznyuk, O. (2025). Professional training of future masters of primary education in higher education institutions of Ukraine: Current experience. *Mountain School of Ukrainian Carpaty*, 31, 64-70. [doi: 10.15330/msuc.2024.31.64-70](https://doi.org/10.15330/msuc.2024.31.64-70).
- [6] Cindrić, J., Anđelković, M., & Chiro, D. (2024). [Knowledge-based education for the future](#). *International Journal of Economics and Law*, 14(41), 11-25.
- [7] DeBacker, D., Kingston, N., Mason, J., Parsons, K., Patelis, T., & Specht-Boardman, R. (2024). A research agenda for competency-based education. *Competency-Based Education Research Journal*, 1(1). [doi: 10.17161/cberj.v1.23064](https://doi.org/10.17161/cberj.v1.23064).
- [8] Diachenko, N., & Usaty, A. (2021). Competency-based approach and soft skills in modern educational paradigm. *Zhytomyr Ivan Franko State University Journal. Pedagogical Sciences*, 1(104), 78-86. [doi: 10.35433/pedagogy.1\(104\).2021.78-86](https://doi.org/10.35433/pedagogy.1(104).2021.78-86).
- [9] Diadiushkin, R. (2025). Theoretical foundations for implementing modern models of professional training for future IT specialist. *Zhytomyr Ivan Franko State University Journal. Pedagogical Sciences*, 4(123), 116-125. [doi: 10.35433/pedagogy.4\(123\).2025.9](https://doi.org/10.35433/pedagogy.4(123).2025.9).

- [10] Fu, B., He, Y., Li, Y., & Yao, Y. (2025). An exploration of the outcome-based education teaching model driven by dual knowledge and competency frameworks. *Journal of Modern Educational Theory and Practice*, 2(11). doi: [10.70767/jmetp.v2i11.885](https://doi.org/10.70767/jmetp.v2i11.885).
- [11] Hao, J. (2024). Research on the impact of competency-based curriculum design on student learning outcomes. *Journal of Modern Educational Theory and Practice*, 1(2). doi: [10.70767/jmetp.v1i2.272](https://doi.org/10.70767/jmetp.v1i2.272).
- [12] Holubnychy, L., Shchokina, T., & Soroka, N. (2023). The anthropological approach to education and modern training and learning methodology. *Educational Challenges*, 28(1), 58-71. doi: [10.34142/2709-7986.2023.28.1.05](https://doi.org/10.34142/2709-7986.2023.28.1.05).
- [13] Holubnychy, L., Shchokina, T., Soroka, N., & Besarab, T. (2022). Development of competency-based approach to education. *Educational Challenges*, 27(2), 54-65. doi: [10.34142/2709-7986.2022.27.2.04](https://doi.org/10.34142/2709-7986.2022.27.2.04).
- [14] Khan, S., Ahmed, R.R., Streimikiene, D., Streimikis, J., & Jatoti, M.A. (2022). The competency-based training & assessment, and improvement of technical competencies and changes in pedagogical behavior. *E&M Economics and Management*, 25(1), 96-112. doi: [10.15240/tul/001/2022-1-006](https://doi.org/10.15240/tul/001/2022-1-006).
- [15] Kiesler, N. (2023). Approaching the concept of competency. In *Modeling programming competency: A qualitative analysis* (pp. 17-36). Cham: Springer. doi: [10.1007/978-3-031-47148-3_2](https://doi.org/10.1007/978-3-031-47148-3_2).
- [16] Marcotte, K.M., & Gruppen, L.D. (2022). Competency-based education as curriculum and assessment for integrative learning. *Education Sciences*, 12(4), article number 267. doi: [10.3390/educsci12040267](https://doi.org/10.3390/educsci12040267).
- [17] Matinho, D., Pietrandrea, M., Echeverria, C., Helderma, R., Masters, M., Regan, D., Shu, S., Moreno, R., & McHugh, D. (2022). A systematic review of integrated learning definitions, frameworks, and practices in recent health professions education literature. *Education Sciences*, 12(3), article number 165. doi: [10.3390/educsci12030165](https://doi.org/10.3390/educsci12030165).
- [18] Moldasan, K., Assilbek, N., & Aitbekova, Z. (2023). Competency-based approach to learning is a new trend in education. *Journal of Educational Sciences*, 76(3), 159-165. doi: [10.26577/JES.2023.v76.i3.013](https://doi.org/10.26577/JES.2023.v76.i3.013).
- [19] Mukan, N., Chubinska, N., & Zhongjun, G. (2023). [Competency-based approach in higher education: The main concepts](https://doi.org/10.26577/JES.2023.v76.i3.013). *Academic Visions*, 17.
- [20] Nikitchenko, L., Davydova, Z., Krylova, V., Samborska, O., & Arkushyna, H. (2024). Innovative approaches to learning and teaching in Ukrainian higher education. *Cadernos de Educação Tecnologia e Sociedade*, 17(1), 495-505. doi: [10.14571/brajets.v17.n1.495-505](https://doi.org/10.14571/brajets.v17.n1.495-505).
- [21] Polinkevych, O., Kuzmak, O., Shpylova, V., & Kamiński, R. (2026). Competency-based approach as a tool for forming sustainable business ecosystems: Case studies on the quality of education towards sustainable development of territories. In *Data-centric business and applications: Modern trends in financial and innovation data processes 2025* (pp. 99-120). Cham: Springer. doi: [10.1007/978-3-032-10153-2_5](https://doi.org/10.1007/978-3-032-10153-2_5).
- [22] Polz, E., & Bećirović, S. (2022). *Competency-based teaching and learning*. Retrieved from <https://ssrn.com/abstract=4318854>.
- [23] Rhoney, D.H., Chen, A.M., Churchwell, M.D., Daugherty, K.K., Jarrett, J.B., Kleppinger, E.L., Nawarskas, J.J., Sibickyh, S.L., Stowe, C.D., & Meyer, S.M. (2024). The need for competency-based education. *American Journal of Pharmaceutical Education*, 88(6), article number 100706. doi: [10.1016/j.ajpe.2024.100706](https://doi.org/10.1016/j.ajpe.2024.100706).
- [24] Romanyshyn, Y., & Briukhovetska, I. (2024). Implementation of the competence-based approach: Methodological recommendations for higher education in Ukraine. *Academia Polonica*, 62(1), 98-103. doi: [10.23856/6213](https://doi.org/10.23856/6213).
- [25] Seguel-Arriagada, A., Jiménez-Pérez, L.A., Torres, S., & Sepúlveda-Valenzuela, E. (2025). Gender subjectivity in competency-based training: A systematic review. *The International Journal of Learning in Higher Education*, 33(1), article number 217. doi: [10.18848/2327-7955/CGP/v33i01/217-248](https://doi.org/10.18848/2327-7955/CGP/v33i01/217-248).
- [26] Skulmowski, A. (2024). Learning by doing or doing without learning? The potentials and challenges of activity-based learning. *Educational Psychology Review*, 36(1), article number 28. doi: [10.1007/s10648-024-09869-y](https://doi.org/10.1007/s10648-024-09869-y).
- [27] Tarmo, A., & Kimaro, A. (2021). The teacher education curriculum and its competency-based education attributes. *The Journal of Competency-Based Education*, 6(3), article number e01255. doi: [10.1002/cbe2.1255](https://doi.org/10.1002/cbe2.1255).
- [28] Thummaphan, P., Sripan, K., & Prakobthong, W. (2022). Competency-based school curriculum: A development and implementation framework. *Community and Social Development Journal*, 23(3), 185-205. doi: [10.57260/rcmrj.2022.261665](https://doi.org/10.57260/rcmrj.2022.261665).
- [29] Vargas, H., Heradio, R., Farias, G., Lei, Z., & de la Torre, L. (2024). A pragmatic framework for assessing learning outcomes in competency-based courses. *IEEE Transactions on Education*, 67(2), 224-233. doi: [10.1109/TE.2023.3347273](https://doi.org/10.1109/TE.2023.3347273).
- [30] Vitchenko, A., Vitchenko, A., Zamotaieva, N., Khrystiuk, S., & Nikolayenko, V. (2022). Designing integral learning outcomes in higher education within the frameworks of the competency-based approach. *Journal of Higher Education Theory and Practice*, 22(6). doi: [10.33423/jhetp.v22i6.5223](https://doi.org/10.33423/jhetp.v22i6.5223).
- [31] Wei, C.F., & Lii, P. (2022). Evaluation of an occupational competency-based curriculum and its impacts on learning outcomes. *Technium Social Sciences Journal*, 32(1), 157-183. doi: [10.47577/tssj.v32i1.6505](https://doi.org/10.47577/tssj.v32i1.6505).

Ірина Каменська

Кандидат сільськогосподарських наук, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0003-2872-5065>

Наталія Редзюк

Доктор філософії, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0002-8697-349X>

Михайло Бойко

Кандидат історичних наук, викладач
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0003-4326-2564>

Компетентісно орієнтоване навчання як сучасна дидактична парадигма у педагогічній науці

Анотація. Метою дослідження було розкриття теоретичних засад, дидактичних принципів і механізмів реалізації компетентісного підходу в освітньому процесі. Методологія дослідження ґрунтувалася на послідовному застосуванні теоретичного, порівняльного, функціонального та критичного аналізу, систематизації, теоретичного синтезу й моделювання для уточнення понятійного апарату компетентісного підходу, визначення його дидактичних принципів, методологічних основ і механізмів реалізації в освітньому процесі. Застосування цих методів забезпечило послідовне вивчення теоретичних, методологічних і практичних аспектів компетентісного підходу та дозволило описати його як цілісну систему. У результаті дослідження було встановлено, що компетентісний підхід визначає зміну логіки освітнього процесу через переорієнтацію результатів навчання на здатність до діяльності. Було розмежовано поняття «компетенція» як нормативно задану вимогу та «компетентність» як фактичний освітній результат, що проявляється у здатності застосовувати знання, уміння та досвід у конкретних ситуаціях. Виявлено, що структура компетентності має інтегративний характер і включає когнітивний, операційний, ціннісно-мотиваційний компоненти та досвід діяльності, які функціонують у взаємозв'язку. Визначено, що відмінність компетентісного підходу від знанневої моделі полягає у зміні функції знань, які розглядаються як засіб дії. Було конкретизовано принципи компетентісно орієнтованого навчання, серед яких орієнтація на результати навчання, діяльнісний характер, інтегративність змісту, контекстність, суб'єктність і рефлексивність. Встановлено, що їх узгоджене застосування забезпечує формування здатності до виконання практичних і професійно орієнтованих завдань. Окреслено методологічні основи підходу через інтеграцію діяльнісного, особистісно орієнтованого, системного підходів і конструктивістських ідей навчання. Показано, що реалізація компетентісного навчання супроводжується зміною ролі викладача, використанням активних методів навчання та впровадженням оцінювання, орієнтованого на діяльність здобувача освіти. Практична значущість дослідження полягає у можливості використання отриманих положень для проєктування освітніх програм, добору методів навчання та розроблення систем оцінювання, орієнтованих на формування компетентностей

Ключові слова: освітній процес; здобувач освіти; інтегративність змісту; контекстність; освітній результат

**Olena Bokshyts***

PhD in Historical Sciences, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0002-3528-5312>

Vasyl Yakuba

PhD in Historical Sciences, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0002-2228-8522>

Digital transformation of the university educational environment: Pedagogical challenges and social consequences

Abstract. The study aimed to provide a comprehensive substantiation of the digital transformation of higher education. The methodology included an analysis of scholarly sources and strategic documents in the field of digital transformation in education, the conceptualisation of key concepts, a comparative analysis of traditional and digital learning models, and structural-functional modelling. The main findings of the study show that the digital transformation of education was systematically generalised as a multi-level process that simultaneously covers the pedagogical, technological and organisational dimensions of university functioning. The concept of the “digital educational environment of a university” was defined and conceptually clarified as an integrated ecosystem that includes digital platforms, educational content, communication channels, administrative systems and participants in the educational process who interact within a networked digital structure. The study established that digital transformation leads to a systemic change in the roles of participants in the educational process: the teacher is transformed from a transmitter of knowledge into a facilitator and designer of the learning environment, while the student acquires the status of an active agent and co-creator of knowledge. It was found that the key characteristics of the digital educational environment are interactivity, flexibility, accessibility, personalisation and technological mediation. The study demonstrates that digital educational technologies, including LMSs, online platforms, video communication and interactive tools, are becoming a central element in the organisation of the learning process. They support not only the transmission of knowledge, but also learning management, assessment, analytics of educational activity and the development of individual educational trajectories. A structural model of a university’s digital educational environment was also developed. It confirms that the effectiveness of the educational process depends on the integration of all components into a single digital system in which interaction between elements is continuous, adaptive and technologically mediated. The practical significance of the study findings lies in their potential use for designing and improving digital educational environments in higher education institutions, developing strategies for the implementation of blended and distance learning, and increasing the effectiveness of educational process management

Keywords: technological mediation; individual trajectories; administrative systems; blended learning; educational content

Suggested Citation:

Bokshyts, O., & Yakuba, V. (2026). Digital transformation of the university educational environment: Pedagogical challenges and social consequences. *Scientia et Societis*, 5(1), 56-69. doi: 10.69587/ss/1.2026.56.

*Corresponding author (alenabokshic@gmail.com)



INTRODUCTION

The digital transformation of universities is reshaping higher education by changing the organisation of the learning environment, the roles of teachers and students, and approaches to knowledge management. Digital technologies expand access to learning, support interactive and distance education, and strengthen student autonomy. At the same time, uneven digital development, insufficient digital competencies and organisational barriers create new challenges for universities. Therefore, research into the digital transformation of the university educational environment is relevant for improving the effectiveness, accessibility and quality of higher education.

In scholarly research, the digital transformation of the educational environment is considered a complex process that encompasses technological, organisational and pedagogical changes in the functioning of universities. The need to examine the impact of digitalisation on private universities provided the basis for empirical analysis. H.S. Majdi *et al.* (2024) investigated the impact of digital transformation on the educational environment of private universities. The authors analysed changes in the organisation of the educational process and emphasised the positive effect of digital technologies on educational effectiveness. They also noted the need to adapt management models to new conditions. These changes included the digitalisation of the educational process, the introduction of online and blended learning formats, the use of learning management systems (LMS), and expanded opportunities for personalising educational trajectories and automating assessment. A systematic review of scholarly publications makes it possible to summarise different approaches to the digital transformation of universities.

A. Fernández *et al.* (2023) conducted a multivocal literature review of digital transformation initiatives in higher education institutions. The authors analysed various models for implementing digital technologies and identified the key areas in the development of digital universities, including digital infrastructure, digital pedagogy, learning analytics and the integration of artificial intelligence into the educational process. The link between digitalisation and the sustainable development of education is addressed in studies of strategic change. L.V. Trevisan *et al.* (2024) examined digital transformation as a factor in sustainable development in higher education. They noted that digitalisation helps improve the efficiency of educational systems by making more effective use of resources, expanding access to highquality learning, reducing the costs of organising the educational process and increasing the adaptability of university systems to socio-economic change. The role of management practices and human capital in the digital transformation of education is also a subject of research.

A. Purwanto *et al.* (2023) analysed the impact of digital transformation and human resource management on university effectiveness. The authors found that the level

of digitalisation directly affects the performance of educational institutions by accelerating management processes, optimising resource use, automating assessment and improving access to educational materials. Barriers to the implementation of digital technologies in higher education form a separate area of research. T. Gkrimpizi *et al.* (2023) classified the main obstacles to the digital transformation of universities. The researchers identified infrastructural, organisational and cultural barriers that complicate the implementation of digital solutions. In practice, these barriers are reflected in inadequate digital infrastructure, fragmented management processes and resistance to change among teaching staff, which limits the effectiveness of assessment and makes equal student access to digital educational resources more difficult. Leadership and student engagement in the digital environment are also considered factors of effectiveness.

V. Niță & I. Guțu (2023) examined the role of leadership in digital transformation and its impact on student engagement. The authors emphasised the importance of management strategies in shaping the digital educational environment. In particular, their findings indicate that digital leadership strategies include proactive change management, support for a digital culture within the university, the development of digital competencies among teachers and students, and the creation of flexible models for managing the educational process, all of which increase student engagement and learning effectiveness. In an analytical review, U.V. Kiriyyenko (2023) conducted a comprehensive analysis of the state of digital transformation in the educational space. The author examined key trends in the digitalisation of education, presented specific cases of digital technology implementation in different countries and types of educational institutions, and focused on existing limitations and barriers, including infrastructural, staffing, methodological and psychological barriers. These key trends mark a transition towards hybrid and fully digital learning models, stronger personalisation of the educational process, the active introduction of data analytics and artificial intelligence into learning management, and the growing role of digital competencies as a basic condition for the effectiveness of contemporary education.

This study aimed to model the digital educational environment of a university in the context of a transition towards innovative, flexible and technologically mediated educational systems. The objectives of the study were to conduct a theoretical and methodological analysis of key concepts and scholarly sources related to the digital transformation of the university educational environment; to carry out a comparative analysis of traditional and digital models of organising the educational process; and to develop a theoretical model of the digital educational environment of a university, taking into account the interaction of its main elements and the transformation of the roles of participants in the educational process.

MATERIALS AND METHODS

The research design was based on a theoretical and analytical approach involving source systematisation, content analysis, comparative analysis and theoretical modelling of the digital educational environment of universities. A set of interrelated methods was used to study the digital transformation of the university educational environment, enabling a staged examination of changes in educational systems under the influence of digital technologies and artificial intelligence. At the first stage, the method of generalisation and systematisation of scholarly and regulatory sources was applied. To analyse the pedagogical challenges and social consequences of digital transformation, a qualitative analysis of scholarly publications and strategic documents was conducted. Scholarly sources were searched in the international databases Scopus, Web of Science, Google Scholar and OECD iLibrary to ensure the high academic validity of the materials. The main keywords were: “digital transformation of higher education”, “digital learning environment”, “educational technology”, “AI in education”, “digital competence of teachers”, and “pedagogical challenges of digitalization”. The study mainly used sources published between 2017 and 2025. These included scholarly sources, namely J. Hylen (2006), D.R. Garrison & N.D. Vaughan (2008), R. Eynon & L.-E. Malmberg (2021), O. Gherman *et al.* (2022), H. Crompton & D. Burke (2023), A. Allouche (2024). The study included studies by O. Kovalenko & I. Kutelmah (2025), N. Oliynyk *et al.* (2025), and S. Danylyuk (2025), which formed the empirical and theoretical basis for examining digital transformation in higher education. Sources published outside the 2017-2025 period were included in the analysis as foundational theoretical and methodological studies that are fundamental in nature and were used to develop the conceptual framework of the study.

International strategic and policy documents were examined, namely OECD (2023), the Rolling plan for ICT standardisation (2025), the Digital Education Action Plan (n.d.) and DigCompEdu (Punie & Redecker, 2017). Practical reports and analytical materials produced by international organisations were also analysed, including More than 48,000 Ukrainian teachers enrolled in UNESCO’s “digital teacher” training (2024), Latest report addresses digital transformation in blended learning environments (2024) and Digital education content: Guidelines for teachers and interoperability framework (2026). The sources were selected according to the following criteria: scholarly validity, meaning peer-reviewed publications or official publications of international organisations; thematic relevance, meaning a direct connection with the digital transformation of higher education; currency, with priority given to publications issued after 2017; and analytical depth. Using the method of systems analysis, the key structural components of the digital educational environment were identified, and their interrelations within an integrated educational system were determined. Aspects such as changes in the roles of participants in the educational

process, the technological mediation of learning, the personalisation of educational trajectories, the integration of artificial intelligence, and the infrastructural and organisational constraints of digital transformation were examined.

At the second stage, the method of abstraction was applied. This made it possible to move from the description of individual phenomena to the formation of generalised theoretical categories of digital education. Within this stage, the content of the key concepts was clarified: “digital transformation of education” was defined as a systemic change in the educational paradigm under the influence of technology; the “digital educational environment of a university” as an integrated ecosystem of interaction among students, teachers, platforms and resources; and “digital educational technologies” as a set of tools, including LMSs, online platforms and AI systems, that support the educational process. The key characteristics of the digital educational environment were also identified: interactivity, flexibility, accessibility, personalisation and technological mediation. To identify structural changes in the organisation of the educational process, a comparative analysis was conducted of the traditional, classroom-oriented learning model and the digital, technologically mediated learning model. The comparison of traditional and digital learning models was carried out according to the following criteria: the format of educational process organisation, the nature of pedagogical interaction, the distribution of the roles of teacher and student, the level of learner autonomy, the extent and functional role of digital technology use, the accessibility of learning materials, the pace of learning, approaches to assessment, the organisation of the educational process and the type of educational environment.

At the final stage, the method of theoretical modelling was used to construct a model of the digital educational environment of a university. The model includes such structural elements as the teacher, the student, digital platforms, including LMSs and educational services; educational content; communication channels; and administrative and analytical systems, all of which were derived from the analysis of the above-mentioned strategic documents. The model was analysed according to such criteria as the functional role of elements within the system, the nature of interaction between participants, the degree of technological mediation, changes in the roles of the teacher and the student, and the level of integration of digital technologies. The limitation of the study was that the analysis of the digital transformation of education was based mainly on theoretical and analytical sources, without extensive empirical measurement of practices in individual universities.

RESULTS

In the context of the development of the information society, higher education institutions are undergoing substantial transformations caused by the rapid introduction of digital technologies. Universities are gradually moving from traditional models of organising the educational

process towards digitally oriented educational environments that involve the use of online platforms, electronic resources and interactive learning tools. This transformation changes not only the instrumental basis of education, but also its content, teaching methods and the nature of interaction between participants in the educational

process. The digital educational environment of a university is regarded as an integrated socio-technical ecosystem that combines technological, pedagogical and organisational components. The digital transformation of education is accompanied by a range of pedagogical challenges and social consequences that require focused analysis.

Table 1. Pedagogical challenges and social consequences of the digital transformation of higher education

Category	Pedagogical challenges	Social consequences
Changing roles of participants	The teacher's transition from transmitter of knowledge to facilitator; the need for new competencies	Increased student autonomy; risk of loss of motivation among some learners
Technological mediation	Reduced quality of direct communication; screen fatigue	Increased social isolation and a widening digital divide among students
Personalisation and adaptability	Difficulty in creating individual trajectories; increased workload for teachers	Greater inequality in access to high-quality education
Integration of artificial intelligence as a component of the digital environment	The need to ensure the ethical use of AI, maintain academic integrity and develop students' critical attitude towards algorithms	Changing requirements for graduates' competencies and for the teacher's role in AI-supported learning
Infrastructural and organisational constraints	Insufficient interoperability of systems; data silos	Limited access to high-quality digital education in the regions

Source: compiled by the authors based on Digital Education Action Plan (n.d.), J. Hylen (2006), D.R. Garrison & N.D. Vaughan (2008), Y. Punie & C. Redecker (2017), R. Eynon & L.-E. Malmberg (2021), O. Gherman *et al.* (2022), OECD (2023), H. Crompton & D. Burke (2023), Latest report addresses digital transformation in blended learning environments (2024), More than 48,000 Ukrainian teachers enrolled in UNESCO's "digital teacher" training (2024), A. Allouche (2024), S. Danylyuk (2025), N. Oliynyk *et al.* (2025), O. Kovalenko & I. Kutelmah (2025), Rolling plan for ICT standardisation (2025)

The analysis of the data presented in the table shows that the digitalisation of higher education creates a complex balance between new opportunities and risks. The main pedagogical challenges remain the restructuring of the roles of participants in the educational process, ensuring the quality of interaction under conditions of high technological mediation, and the effective integration of artificial intelligence as a component of the digital educational environment. At the social level, the most pressing consequences are the risk of increasing educational inequality and the need to support participants in the educational process. These challenges can be addressed effectively only through the systematic integration of technological, pedagogical and organisational efforts.

OECD (2023) reports emphasise that digital technologies have transformed education and that the COVID-19 pandemic accelerated their integration into learning processes. At the same time, they stress that digitalisation should serve the goals of quality, equity and efficiency in education systems. The OECD also specifies the systemic nature of digital transformation by identifying the political, institutional and pedagogical dimensions of digital education, including infrastructure, governance, funding and the development of digital competencies. The European Union is developing an integrated digital education policy through the Digital Education Action Plan (n.d.), which sets strategic priorities for the development of digital skills, inclusive education and digital infrastructure. The plan also emphasises the need for cross-sectoral policy coordination (Rolling plan for ICT standardisation, 2025). An analysis of international approaches adopted by the OECD and the European Union shows

that the digital transformation of education is viewed as a multidimensional process that involves not only the introduction of technologies, but also systemic changes in governance, pedagogy and education policy. At the same time, emphasis is placed on the fact that the effectiveness of digitalisation is determined by its focus on quality assurance, equal access and the development of digital competencies, which makes it a key factor in the modernisation of contemporary education systems.

In addition, within this approach, the EU is developing practical tools for educators, including recommendations on the selection and use of digital content in teaching. These recommendations include criteria for quality, safety and pedagogical appropriateness (Digital education content..., 2026). The European Commission also emphasises the development of interoperability between educational systems, which is a necessary condition for forming a common European education area. Thus, international organisations view the digital transformation of education as a complex, multi-level process that includes not only technological infrastructure, but also pedagogical models, competency development and equal access. UNESCO policy represents a separate dimension of digital transformation, as it implements programmes to support teachers in the digital environment. In particular, the Digital Teacher programme is being implemented in Ukraine to develop teachers' digital competencies and support distance and blended learning. The programme has already reached more than 48,000 Ukrainian teachers, indicating a large-scale need for digital pedagogical transformation. In Ukraine, the digitalisation of education is taking place under martial law, which increases pressure on the

education system and accelerates the implementation of digital solutions (More than 48,000 Ukrainian..., 2024). Studies show that Ukrainian universities demonstrate adaptability to digital technologies, although they face infrastructural and staffing constraints (Danylyuk, 2025). An analysis of the transformation of language education in Ukraine within the DigiFLED project confirms that effective digitalisation is based on a combination of strategic management, digital pedagogical models, the development of LMS systems and the integration of artificial intelligence (Oliynyk *et al.*, 2025). Therefore, at the national level, the digitalisation of higher education in Ukraine combines global trends with local challenges caused by martial law and is characterised by the accelerated adaptation of universities to new conditions.

In the broader scholarly discourse, the digital transformation of education is viewed as a systemic restructuring of pedagogical models, involving a shift towards personalised, microlearning and AI-oriented approaches. Emphasis is placed on the formation of a new pedagogy based on creativity, humanism and meaning-making (Allouche, 2024). It is also stressed that digital technologies have become the main learning environment, which requires new teaching models and personalised educational trajectories (Gherman *et al.*, 2022). EU reports also state that the COVID-19 pandemic acted as a catalyst for the transition to digital and blended learning, while also revealing problems of unequal access, insufficient digital competency among teachers and the need for systematic investment in digital infrastructure (Latest report addresses digital transformation in blended learning environments, 2024). In Ukraine, UNESCO initiatives aimed at supporting teachers during the wartime period have become particularly relevant. In particular, the Digital Teacher programme was developed jointly with the Ministry of Education and Science of Ukraine (MESU) and Google.org to develop digital pedagogical competencies and support distance and blended learning (UNESCO and MESU..., 2023). This initiative aims to improve the digital skills of at least 50,000 teachers and includes modules on digital pedagogy, assessment, classroom management and support for teachers' psychological well-being. The programme also provides for the creation of a professional community for sharing experience and teaching methods (More than 48,000 Ukrainian..., 2024). Research on the digital transformation of higher education in Ukraine and the Czech Republic shows that, despite different institutional and resource conditions, both countries have demonstrated gradual adaptation to digital change after the COVID-19 pandemic. At the same time, universities face infrastructural constraints, but show a high level of flexibility and capacity for innovation through international cooperation (Danylyuk, 2025). In the field of language education in Ukraine, digital transformation is marked by uneven implementation, which is linked to varying levels of teachers' digital competency and infrastructural limitations. At the same time, research conducted within Erasmus+ projects shows that effective digital

transformation requires strategic coherence, the development of LMS systems and the integration of artificial intelligence into the educational process.

A separate area of UNESCO research focuses on the development of teachers' digital competencies, including the ethical use of artificial intelligence, open educational resources and digital literacy. This confirms the global trend towards a systemic approach to preparing teachers for the digital transformation of education (Kovalenko & Kuteimah, 2025). European guidelines for online and blended learning are also being developed. They cover digital pedagogy, inclusion, accessibility and the use of artificial intelligence in education as an integral component of the learning environment (Guidelines for online and blended learning..., 2024). The methodological basis of research into the digital transformation of education is formed at the intersection of three interrelated areas: theories of blended and online learning; concepts of open educational resources and digital competencies; and approaches to the integration of artificial intelligence and digital policy in education. Together, these areas form a multi-level framework for analysing educational change in the digital age. Summarising international and national experience, it can be stated that the digital transformation of education is now viewed as a socio-technical restructuring in which technology serves not merely as a tool, but as a catalyst for changes in the pedagogical paradigm, the roles of participants and the organisational structure of universities. The classic research by D.R. Garrison & N.D. Vaughan (2008) considers blended learning as the integration of classroom-based and online learning into a single pedagogically coherent system, in which the key issue is not the technological component, but the restructuring of educational interaction. In this model, the central aim is the development of so-called "communities of inquiry", in which learning occurs through communication between students, teachers and the digital environment. In the same vein, this model serves as a basis for interpreting hybrid education not only as a technological solution, but as a new didactic paradigm that alters the organisation of teaching, assessment and academic communication. The concept of open educational resources defines open educational resources as a strategic tool for expanding access to knowledge, reducing educational inequality and stimulating academic cooperation (Hyllen, 2006). Methodologically, the presented concept provides a basis for a study of digital education from the positions of openness, the re-use of educational content and the reduction of barriers to access to educational content. Therefore, education can be viewed as an environment for the creation of shared knowledge and not as a system isolated from society. The research of R. Eynon & L.-E. Malmberg (2021) focuses on the connection between digital skills, learning activity and the quality of online learning. The authors argue that digital competency is a multifaceted phenomenon, which includes not only technical skills, but also critical thinking, the ability to self-regulate learning processes, and other skills for

autonomous learning. In methodological terms, this provides grounds for taking into account the behavioural and cognitive components of digital learning processes, not only infrastructural and technological ones.

H. Crompton & D. Burke (2023) consider artificial intelligence in higher education as a multilevel set of applications that can include the use of learning analytics and automated assessment, the development of individual learning trajectories and the use of artificial intelligence for administrative management optimisation. The authors stress that the main challenges lie not only in the technological implementation of AI, but also in issues of ethics, algorithmic transparency, academic integrity and the changing role of the teacher. This leads to the methodological conclusion that AI should be considered an element in the transformation of the educational ecosystem, rather than a separate tool. A key framework for analysing the digital transformation of education is DigCompEdu, developed by the European Commission. It defines the structure of teachers' digital competencies across six areas: professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners' digital literacy. This framework makes it possible to standardise approaches to measuring the digital maturity of education systems and serves as a basic tool for comparative analysis of teachers' digital competency across countries (Punie & Redecker, 2017). The Digital Education Action Plan (n.d.) provides a strategic framework for the development of digital education in the EU, based on two priorities: the development of a digital education ecosystem and the formation of digital competencies throughout life. Thus, the theoretical and methodological basis of the study makes it possible to view digital transformation not as a set of separate technological innovations, but as a systemic process of restructuring the educational ecosystem, in which pedagogy, policy, technology and the human factor interact. In methodological terms, this document is relevant because it moves digital education from the level of individual innovations to the level of systemic policy covering infrastructure, pedagogy, governance and assessment. The national strategy for the digital transformation of education and science in Ukraine defines digitalisation as a key area in the modernisation of the education system. It includes the development of digital infrastructure, the improvement of teachers' digital competencies and the integration of educational technologies into the learning process. In methodological terms, this provides a basis for a study of the Ukrainian educational context as a system that is undergoing accelerated transformation as a result of external factors (such as war, globalisation) and internal factors (such as reforms, digitalisation) (Ukraine: Digital transformation..., n.d.). Thus, this structure of the concept allows understanding of the digital transformation of education as a systemic process for the reconstruction of the educational ecosystem, which includes pedagogical, legislative, technological and humanistic components interacting with each other.

Summarising approaches to the digitalisation of education on the basis of the preceding source analysis, it can be observed that the central substantive core of all these changes is the digital transformation of education. This transformation is not limited to the introduction of technological tools; rather, it involves restructuring the very logic of organising the educational process, managing knowledge and shaping interaction among participants in the educational environment. At the same time, technology is not considered to be a supplementary tool for the educational process but a system-building factor that transforms the way of learning, teaching and assessing the results of learning. In this process, a digital educational environment of a university forms that should be understood as an integrated ecosystem consisting of digital platforms, educational content and resources, administrative management systems and participants in the educational process. It functions as an integrated structure in which teachers, students, administrators and external educational services interact, while learning activity is carried out through a combination of different digital channels of communication and access to knowledge. Such an environment is dynamic and constantly changes under the influence of new technological solutions that expand the possibilities of learning and educational process management. Its functioning is supported by digital educational technologies, including learning management systems (LMSs), online platforms, video conferencing, interactive simulations and artificial intelligence as an important component of the digital educational environment. Artificial intelligence serves as a tool for implementing personalised educational trajectories, automated assessment, learning analytics and adaptive content that become part of the educational process.

Digital technologies have a fundamental impact on the organisational structures and management mechanisms of educational processes at universities. One of the main components is learning management systems (LMSs), where learning content, tasks, assessment tools and communication channels are concentrated. In the framework of the LMSs, learning takes a structured and modular form, when the teacher has the opportunity to plan the educational course, and the student has the possibility to independently choose the tempo and sequence of material. Online platforms and video communication technologies for remote learning change the types of learning interaction and provide access to educational resources. Educational materials are now accessible at any time and from anywhere, which helps to promote flexible and blended learning models. Video conferencing and interactive services change the nature of communication between the teacher and students by enabling synchronous and asynchronous interaction. At the same time, they reduce the share of direct face-to-face communication, which affects the quality of social interaction within the educational environment. The use of digital analytics and artificial intelligence fundamentally changes approaches to assessment, feedback and educational process management. Learning analytics

makes it possible to track students' progress in real time, identify problem areas and adapt learning content to individual needs. Artificial intelligence technologies can be included in the automation of assessment and support of pedagogical activities. These components contribute to the development of a flexible digital model for managing educational activities.

Blended learning, which combines traditional classroom-based teaching with digital and online elements, is becoming increasingly important. It allows combining the pedagogical advantages of face-to-face interaction with the teacher and the student in the classroom and the potential of digital learning platforms and tools, which leads to the flexibility of the organisation of the educational process and the expansion of its interactive space. Also, the model of remote learning can be singled out, in which, unlike the former model, the student is completely or mainly absent from the premises, and the process of learning is carried out using technologies for remote communication. This form of learning became particularly relevant in crisis situations, when continuity of education had to be ensured regardless of spatial and social constraints. All these forms of learning organisation share common features of the digital educational environment. First, this environment is marked by interactivity, which ensures active interaction between participants in the educational process and digital resources, thereby changing the traditional passive model

of learning. Another feature is flexibility, which makes it possible to adapt the pace, format and content of learning to the individual needs of learners. The model of accessibility is also worth highlighting, as it is characterised by the possibility of obtaining educational resources, taking into account the time and location of the person.

It is necessary to highlight the model of individualising education, which becomes possible by analysing data and using digital technologies, which allows the creation of the individual's educational programme and taking into account their needs, level of preparation and learning behaviour of students. All these trends are implemented with the help of technological mediation, which is characterised by a degree of dependency of the learning process on digital tools and technologies, which serve as the primary environment for the delivery of the learning process. As a consequence, conventional approaches to education are shifting to more complex digitally mediated approaches, where the learning process becomes more adaptive, collaborative, and individualised, and technology becomes a core element of the learning context. The generalisation of these approaches makes it possible to move to a comparative analysis of traditional and digital learning models, since their comparison most clearly demonstrates the depth of the transformations taking place in education. To systematise these differences, it is advisable to use the summary comparison Table 2.

Table 2. Comparative analysis of traditional and digital learning models

Criterion	Traditional learning model	Digital learning model
Learning format	Mainly classroom-based, fixed in time and space	Online, blended or hybrid, flexible in time and space
Nature of interaction	Direct, face-to-face, synchronous communication	Technologically mediated, with synchronous and asynchronous interaction through platforms
Role of the teacher	Main source of knowledge; transmitter of information	Facilitator, tutor, moderator of the educational process and designer of the learning environment
Role of the student	Mainly a passive listener; an object of the educational process	Active participant, subject of learning and co-creator of knowledge
Level of learner autonomy	Limited; dependent on the teacher and timetable	High; enables individual learning trajectories and selfregulation
Use of technology	Auxiliary, including presentations and basic digital resources	Key and system-forming, including LMSs, online platforms, AI tools and interactive environments
Access to learning materials	Limited by the classroom and physical resources	Continuous remote access to digital resources
Pace of learning	Uniform for the whole group	Individualised and adaptive
Assessment	Mainly summative and standardised	Continuous and formative, using digital analytics
Organisation of the educational process	Rigidly structured	Flexible, modular and adaptive
Educational environment	Physical space, namely the classroom	Digital educational environment as an integrated system of platforms and resources

Source: compiled by the authors based on UNESCO (n.d.), P. Black & D. Wiliam (1998), D.R. Garrison & H. Kanuka (2004), G. Siemens (2005), D. Laurillard (2012), G. Siemens & R.S.J.d. Baker (2012), C.R. Graham (2013), T. Bates (2019), OECD (2020)

The summary of the table shows that traditional and digital learning models differ fundamentally in the logic of educational process organisation. The traditional model is more rigidly structured, with the teacher playing the leading role and the student having limited autonomy, while technology performs an auxiliary function. In the digital

model, the system is flexible, collaborative, and heavily customised. In this model, the student becomes an active participant in learning, while the teacher acts as a facilitator. Technology assumes the status of a key element of the educational environment, ensuring accessibility, adaptability and a variety of learning formats. Overall, there

is a shift from a classic classroom-oriented system to a digital, student-centred model of education. Moving on from the comparative analysis of traditional and digital learning models, it is logical to deepen the discussion and proceed to a more structural level: the theoretical modelling of the digital educational environment of a university (Table 3). This approach makes it possible not only to identify the differences between educational models, but also to show

the internal architecture of the digital system, its elements and the nature of interaction between them. The university is a digital ecosystem open for the delivery of education through the interactions between actors and technological means. The main object of attention is not any separate part of it, but their combination into a single digital space in which the roles of the participants, communication forms, and knowledge access mechanisms are changing.

Table 3. Model of the digital educational environment of a university

Model element	Function in the system	Nature of interaction	Transformation of the role in the digital environment	Level of digital technology integration and examples
Teacher	Organisation and delivery of the educational process	Through LMSs, communication tools and digital content	From bearer of knowledge to facilitator, tutor and designer of the learning experience	Deep: LMSs + authoring tools, including Moodle, Google Classroom and Microsoft Teams
Student	Acquisition and construction of knowledge	Active interaction with digital platforms and the teacher	From passive consumer to active co-creator of the educational process	Deep: personalised trajectories in Moodle and adaptive learning systems
Digital platforms (LMSs)	Technological basis for organising learning	Centralised access to content, assessment and communication	Central infrastructural core of the ecosystem	Critical: Moodle, Canvas and Blackboard with H5P and BigBlueButton modules
Educational content	Content of learning	Multimedia-based, interactive and adaptive	Shift towards a personalised and interactive format	High: interactive videos (H5P), SCORM packages, simulations, VR/AR content and AI-based adaptive systems
Communication channels	Ensuring interaction between participants	Synchronous and asynchronous digital communication	Expansion towards continuous networked interaction	High: Zoom, Microsoft Teams, Discord, Moodle forums and Slack
Administrative systems	Management of the educational process	Integration with LMSs, analytics and automation	Shift towards data-driven management	Partial: USEDE, automated university management systems and API integration with Moodle, which is not always complete

Note: LMS – Learning Management System; H5P – HTML5 Package; SCORM – Sharable Content Object Reference Model; VR – Virtual Reality; AR – Augmented Reality; API – Application Programming Interface; USEDE – Unified State Electronic Database on Education

Source: compiled by the authors based on Digital Education Action Plan (n.d.), Y. Punie & C. Redecker (2017), OECD (2023), More than 48,000 Ukrainian teachers enrolled in UNESCO's "digital teacher" training (2024), Latest report addresses digital transformation in blended learning environments (2024), Rolling plan for ICT standardisation (2025), Digital education content: guidelines for teachers and interoperability framework (2026)

The digital educational environment of the university represents a socio-technical ecosystem of a unified system formed by combining all elements of the educational process (educational platforms and materials, information support, analytics, and administrative management systems). Such integration ensures not just technical interconnection, but the mutual dependence of parts of the system. This means that a change in the functioning of one of the components of the educational process, for example, LMS or evaluation system, automatically affects other levels and mechanisms of the educational process. As a result, the university environment acquires the features of an integrated digital system in which educational processes are managed through data and digital platforms. This system also includes a network structure with the distribution of the participants in the educational process and the interaction of digital technologies. In this sense, the learning ecosystem is not a hierarchical model, but a group of components, for example, LMSs, video conferences, cloud technologies, analytics platforms, which are interconnected. Data, learning resources, and feedback pass across them.

At the same time, the integration is uneven: some systems operate as the core of the digital infrastructure, while others remain fragmented or weakly connected, creating so-called "digital islands" and limiting the full seamlessness of the educational process.

Technological mediation is a means to transform the interaction between the pedagogical actors within the digital context. It implies replacing or complementing the direct contact between the teacher and the student with a set of digital channels like video lectures, message forums, chats, auto-evaluation systems, and learning management platforms. Technology performs not merely a function of transmission, but also influences the educational process, shaping its components such as material format, feedback dynamics, evaluation methods, and student activity levels. Thus, the educational interaction becomes mediated, algorithmised, and partially automated. Within this transformation, the roles of participants in the educational process are also changing. The teacher is gradually moving from the function of the main bearer of knowledge to the role of designer of the digital learning environment, facilitator,

tutor and learning data analyst who coordinates students' educational trajectories. The student transforms into an active subject who, on their own, directs their educational pathway, interacts through digital tools and contributes to the process of creating knowledge. In general, systemic integration, networked structure, technology and changing roles are the components that create a new model of the university as an open digital ecosystem that is oriented on data, interaction and adaptation. Overall, the study findings confirm that the digital transformation of education is not merely a stage of modernisation, but a systemic change in the educational paradigm. It forms a new model of the university environment that combines a high degree of technological mediation, deep integration of digital systems, individualisation of learning and networked forms of interaction. This opens up prospects for the further development of education as a flexible, adaptive and innovative system capable of responding to societal challenges.

DISCUSSION

The findings obtained in the study of the digital transformation of education make it possible to move on to their interpretation and comparison with the studies of other scholars. The generalisation of approaches shows that the digitalisation of the educational environment is a multi-dimensional process that includes not only technological change, but also deeper transformations in pedagogical models, management approaches and the roles of participants in the educational process. In this regard, it is important to compare the findings with those of previous studies in order to determine the degree of consistency between them, confirm theoretical assumptions and identify possible scholarly divergences. V.M. Prylypko *et al.* (2023) also examined the issue of professional development among teachers in Ukrainian higher education institutions under conditions of digital transformation. The authors analysed the requirements for the digital competencies of academic staff, examined existing professional development systems and proposed ways to improve them. Emphasis is placed on the need for systematic, continuous and purposeful training to prepare teachers for work in a digital educational environment. Systemic barriers to the digitalisation of education are examined separately. A. Singun (2025) conducted a systematic review of barriers to digital transformation in higher education. The scholar identified key challenges, including insufficient digital competencies and the limited technological readiness of institutions. Digital literacy is considered a basic element in the transformation of education. S. Farias-Gaytan *et al.* (2023) analysed the relationship between digital transformation and digital literacy. The researchers noted that the level of digital competencies is a factor in the success of educational reforms. The development of digital learning as a new model of education is the subject of separate studies. M. Alenezi (2023) examined the concept of digital learning and digital universities. The author defined the digital environment as a new form of educational organisation based on technological integration

and flexible educational models. Despite the number of existing studies, the comprehensive modelling of the digital educational environment of a university as an integrated system remains insufficiently explored. Further analysis is also required of the transformation of the roles of teachers and students under conditions of full digitalisation, as well as the interaction between different elements of the educational ecosystem in hybrid learning models.

The digital transformation of education is viewed as a systemic process that alters both the technological tools and the underlying logic of the educational environment; this is consistent with the findings of S. Timotheou *et al.* (2023), who analysed the impact of digital technologies on education and described their role in transforming educational structures. The researchers stated that digitalisation encompasses the technological and institutional changes that contribute to the emerging educational model. The transition from traditional teaching models to flexible digital systems is a natural consequence of the digitalisation of education. This is consistent with O.B. Aded & E. Soykan (2023), who examined the transformation of learning under the influence of online education during the COVID-19 pandemic. The authors noted that digital learning models increase the flexibility of the educational process, but at the same time create new challenges. The digital educational environment of a university is formed as an integrated ecosystem of interaction between technology, people and management processes. This is consistent with J. Paul *et al.* (2024), who analysed digital transformation as an interdisciplinary phenomenon. The study notes that digital education systems function as complex ecosystems that bring together different levels of management and learning.

The findings confirm that the digital transformation of higher education is a systemic socio-technical restructuring in which technology becomes not only a tool, but also a structuring element of the educational environment. This is consistent with the conclusions of I.O. Pappas *et al.* (2023), who examined responsible digital transformation and noted that successful digital transformation is possible only when technological, social and ethical aspects are considered comprehensively. This fully corresponds to the model of the digital educational environment of a university developed in the study. The findings of the study reveal a significant increase in the availability of education and its flexibility due to the introduction of online and blended formats. These conclusions are consistent with the studies by M. Alojail & S.B. Khan (2023) and Q. Xu *et al.* (2023), whose authors analysed the impact of digital transformation on sustainable development and showed that digitalisation significantly improves access to services, including educational services, while also requiring new competencies from all participants in the process. The identified pedagogical challenges related to changes in the roles of teachers and students, as well as the need to develop digital competencies, are in line with the findings of A. Essien *et al.* (2024). The researchers examined the impact of

generative artificial intelligence on students' critical thinking in British business schools and emphasised that the introduction of AI requires a reconsideration of the teacher's role as a facilitator and the activation of students as co-creators of knowledge. The findings on the uneven nature of digital transformation in Ukrainian universities and the need for the systematic integration of platforms are consistent with the position of M. Kanan *et al.* (2023). The authors analysed the transformation of universities towards entrepreneurial models and concluded that the comprehensive implementation of digital management practices and innovation is a key factor in the successful transformation of higher education institutions. Thus, the findings of the present study not only confirm but also specify, in a pedagogical context, the general patterns of digital transformation identified in contemporary scholarly literature.

Digital technologies function not as an auxiliary element, but as a structuring element of education. This is consistent with C. Wang *et al.* (2024) examined global trends in the digitalisation of education. The authors demonstrated that technologies change the very structure of education systems, influencing their organisation and functioning. The role of the teacher is transformed from bearer of knowledge to facilitator and organiser of the learning process. This is consistent with B. George & O. Wooden (2023), who examined the use of artificial intelligence in managing educational transformations. The researchers noted that, in a digital environment, the teacher becomes a guide and support for the student. The student turns into an active subject in the digital environment and forms their own educational trajectory. Y. Li *et al.* (2024) researched how digital educational games impact students' motivation. The authors argue that the digital environment promotes learners' increased motivation and independent learning. Digitalisation of education fosters the development of student autonomy and self-regulation of learning, which is consistent with the findings of S. Dziubaniuk *et al.* (2023), who studied learning in a digital environment using connectivism theory. The study notes that a digital environment stimulates independence and a network form of learning. Digital educational technologies ensure continuity in the learning process regardless of the location and time of the educational process. This corresponds to O.B. Adedoyin & E. Soykan (2023), who identified the role of online learning during the pandemic period. The authors noted that digital technologies became an important mechanism in maintaining educational continuity. Blended learning serves as the most effective model for integrating traditional and digital education. This is consistent with Y. Zou *et al.* (2025), who examined trends in digital learning. The study emphasises that hybrid models are among the most resilient and adaptive forms of education.

Distance learning performs the function of ensuring educational resilience in crisis conditions. This is consistent with S. Saeed *et al.* (2023), who analysed digital transformation under conditions of cyber threats and crises. The researchers noted that online education is relevant to the

stability of education systems. Digital platforms, particularly LMSs, form the central core of educational process organisation. This is consistent with M.H. Al Najdawi *et al.* (2024), who examined the use of digital technologies in higher education. The authors emphasised that LMSs provide the basis for managing learning and assessment. Digitalisation expands access to education and reduces territorial constraints on the learning process. This is consistent with O.B. Adedoyin & E. Soykan (2023), who showed that online learning increases the accessibility of education for different social groups. Education becomes more interactive through digital interaction between participants in the process. This is consistent with M. Liu *et al.* (2023), who examined the use of generative artificial intelligence in education. The authors noted that digital tools enhance the interactivity of learning. Educational content is transformed into a multimedia and adaptive format oriented towards different learning styles. This is consistent with Y. Li *et al.* (2024), who showed that the digital environment makes it possible to create adaptive learning materials that take students' needs into account. Assessment in the digital environment is gradually becoming formative and continuous. This is consistent with S. Timotheou *et al.* (2023), who noted that digital technologies change approaches to assessment and the monitoring of learning outcomes.

Digital analytics is becoming a tool for monitoring students' academic achievement. This is consistent with B. George & O. Wooden (2023), who emphasised the role of data analytics in improving the effectiveness of educational management. The educational process is becoming more personalised through digital technologies and adaptive learning systems. This is consistent with M.H. Al Najdawi *et al.* (2024), who showed that artificial intelligence makes it possible to predict and adapt students' educational trajectories. Digital transformation changes the structure of academic communication, making it networked and multi-channel. This is consistent with J. Paul *et al.* (2024), who noted that digital systems create new forms of communication between participants in the educational process. Education is moving from a linear model of knowledge transmission to an interactive and flexible learning system. This is consistent with S. Timotheou *et al.* (2023), who emphasised that digitalisation changes the classical structure of the learning process. The digital transformation of education is not merely technological modernisation, but a profound change in the educational paradigm. This is consistent with S. Bianchini *et al.* (2023), who considered digital transformation as part of broader systemic changes in society and education. The authors stressed that digitalisation has a long-term structural impact. The generalisation of the study findings makes it possible to state that the digital transformation of education is a complex and multi-level process that covers both the institutional and pedagogical dimensions of the functioning of the education system. It was established that digital technologies act as a system-forming element of the educational environment, changing the nature of interaction

between teacher and student, the structure of the learning process and approaches to assessing learning outcomes. It is also noted that digitalisation fosters the development of flexibility, access, and personalisation in education, which forms a new educational paradigm based on the student, the student's autonomy, and the continuity of learning. Overall, the findings confirm that digital transformation is not merely a stage of modernisation, but a fundamental change in the logic according to which education functions.

CONCLUSIONS

The digital transformation of education is not a local process of technology implementation, but a systemic restructuring of the entire educational paradigm, covering the organisational, pedagogical and communicative levels of the university environment. It has been confirmed that higher education is gradually moving from the traditional model of knowledge transmission to a digital networked ecosystem in which technology performs not an auxiliary, but a structuring function. It was established that the digital transformation of education is reflected in a change in the logic of the educational process: from fixed classroom-based formats to flexible, adaptive and blended learning models. This is accompanied by a shift towards a student-centred educational paradigm, in which the student acts as an active subject of learning, while the teacher is transformed from a bearer of knowledge into a facilitator, tutor and designer of the educational environment. Changes in roles are among the most important quality results of the digitalisation of education.

The digital educational environment at the university is represented by an integrated system that combines digital platforms, learning content, communication systems and administrative services. In the university's digital educational environment, all educational processes are mediated by technology, which ensures continuity in the educational process, accessibility and opportunities to personalise learning paths. A qualitatively new outcome is the formation of a networked structure of the educational process, in which interaction between participants is continuous, multi-channel and dynamic. The findings also confirm that digital educational technologies, including LMSs, online platforms, video communication and

interactive tools, have become a basic infrastructural component of education. They ensure not only the transmission of educational content, but also assessment, analytics, learning process management and feedback. This brings a qualitative change to the organisation of learning, making it more flexible, modular and personalised.

The introduction of digital approaches substantially expands access to education and increases its flexibility. At the same time, the digital competencies of teachers and students become increasingly important as a key factor in the effectiveness of the educational process. The absence or low level of such competencies remains one of the main barriers to high-quality digital transformation. The comparative analysis revealed differences between traditional and digital learning models. Whereas the traditional model is characterised by rigid structure, limited student autonomy and the dominance of the teacher, the digital model is based on interactivity, flexibility, personalisation and the active role of the student. This indicates a transition from a vertical to a horizontal, networked logic of educational interaction.

The theoretical modelling of the digital educational environment of a university made it possible to establish that all its elements, including the teacher, the student, platforms, content, communication systems and administrative systems, function as a single interconnected system. A change in one element automatically affects the transformation of the entire educational ecosystem, confirming its systemic and dynamic nature. Further research should focus on the empirical testing of the effectiveness of digital educational models in different types of higher education institutions, as well as on studying the impact of artificial intelligence on the individualisation and quality of the learning process.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Adedoyin, O.B., & Soykan, E. (2023). Covid-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments*, 31(2), 863-875. doi: 10.1080/10494820.2020.1813180.
- [2] Al Najdawi, M.H., Shwede, F., Mokhtar Abdelmoghies, M., Kitana, A., & Ali, A. (2024). Applying artificial intelligence in predicting educational excellence in higher education institutions: A case study in Jordanian universities. *Edelweiss Applied Science and Technology*, 8(6), 7273-7289. doi: 10.55214/25768484.v8i6.3579.
- [3] Alenezi, M. (2023). Digital learning and digital institution in higher education. *Education Sciences*, 13(1), article number 88. doi: 10.3390/educsci13010088.
- [4] Allouche, E. (2024). Digital transformation of education, systems approach and applied research. *ArXiv*. doi: 10.48550/arXiv.2406.11861.
- [5] Alojail, M., & Khan, S.B. (2023). Impact of digital transformation toward sustainable development. *Sustainability*, 15(20), article number 14697. doi: 10.3390/su152014697.
- [6] Bates, T. (2019). *Teaching in a digital age* (2nd ed.). Vancouver: Tony Bates Associates Ltd.

- [7] Bianchini, S., Damioli, G., & Ghisetti, C. (2023). The environmental effects of the “twin” green and digital transition in European regions. *Environmental and Resource Economics*, 84(4), 877-918. doi: 10.1007/s10640-022-00741-7.
- [8] Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice*, 5(1), 7-74. doi: 10.1080/0969595980050102.
- [9] Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, 20, article number 22. doi: 10.1186/s41239-023-00392-8.
- [10] Danylyuk, S. (2025). Digital transformation in higher education: A comparative analysis of Ukraine and the Czech Republic. *Actual Issues of Modern Science*, 37. doi: 10.47451/soc2025-04-02.
- [11] Digital Education Action Plan. (n.d.). Retrieved from <https://education.ec.europa.eu/focus-topics/digital-education/actions>.
- [12] Digital education content: Guidelines for teachers and interoperability framework. (2026). Retrieved from <https://surl.li/xfdhmh>.
- [13] Dziubaniuk, O., Ivanova-Gongne, M., & Nyholm, M. (2023). Learning and teaching sustainable business in the digital era: A connectivism theory approach. *International Journal of Educational Technology in Higher Education*, 20, article number 20. doi: 10.1186/s41239-023-00390-w.
- [14] Essien, A., Bukoye, O.T., O'Dea, X., & Kremantzis, M. (2024). The influence of AI text generators on critical thinking skills in UK business schools. *Studies in Higher Education*, 49(5), 865-882. doi: 10.1080/03075079.2024.2316881.
- [15] Eynon, R., & Malmberg, L.-E. (2021). Lifelong learning and the Internet: Who benefits most from learning online? *British Journal of Educational Technology*, 52(2), 569-583. doi: 10.1111/bjet.13041.
- [16] Farias-Gaytan, S., Aguaded, I., & Ramirez-Montoya, M.S. (2023). Digital transformation and digital literacy in the context of complexity within higher education institutions: A systematic literature review. *Humanities and Social Sciences Communications*, 10, article number 386. doi: 10.1057/s41599-023-01875-9.
- [17] Fernández, A., Gómez, B., Binjaku, K., & Meçe, E.K. (2023). Digital transformation initiatives in higher education institutions: A multivocal literature review. *Education and Information Technologies*, 28, 12351-12382. doi: 10.1007/s10639-022-11544-0.
- [18] Garrison, D.R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education*, 7(2), 95-105. doi: 10.1016/j.iheduc.2004.02.001.
- [19] Garrison, D.R., & Vaughan, N.D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: John Wiley & Sons. doi: 10.1002/9781118269558.
- [20] George, B., & Wooden, O. (2023). Managing the strategic transformation of higher education through artificial intelligence. *Administrative Sciences*, 13(9), article number 196. doi: 10.3390/admsci13090196.
- [21] Gherman, O., Turcu, C.E., & Turcu, C.O. (2022). An approach to adaptive microlearning in higher education. *ArXiv*. doi: 10.48550/arXiv.2205.06337.
- [22] Gkrimpizi, T., Peristeras, V., & Magnisalis, I. (2023). Classification of barriers to digital transformation in higher education institutions: Systematic literature review. *Education Sciences*, 13(7), article number 746. doi: 10.3390/educsci13070746.
- [23] Graham, C.R. (2013). *Emerging practice and research in blended learning*. In M.G. Moore (Ed.), *Handbook of distance education* (pp. 333-350). New York: Routledge.
- [24] Guidelines for online and blended learning. (2024). Retrieved from <https://digital-pedagogy.eu/guidelines/>.
- [25] Hylen, J. (2006). *Open educational resources: Opportunities and challenges*. Retrieved from https://www.researchgate.net/publication/235984502_Open_educational_resources_Opportunities_and_challenges.
- [26] Kanan, M., Dababat, H., Saleh, Y., Zaid, A., Assaf, R., Zahran, S., Ali Salahat, M., & Al-Sartawi, A. (2023). Impact of total quality management practices on the transformation to entrepreneurial universities in Palestine: The moderating role of innovation. *Operational Research in Engineering Sciences: Theory and Applications*, 6(3), 34-56. doi: 10.31181/oresta/060302.
- [27] Kiriyyenko, U.V. (2023). Digital transformation of the educational space: Trends, cases, limitations (analytical review). *Analytical Herald in the Sphere of Education and Science*, 17, 67-82. doi: 10.33407/lib.NAES.735560.
- [28] Kovalenko, O., & Kutelmah, I. (2025). Digital transformation of teacher professional development in UNESCO policy: International guidelines and the Ukrainian context. *UNESCO Chair Journal Lifelong Professional Education in the XXI Century*, 1(11), 7-21. doi: 10.35387/ucj.1(11).2025.0001.
- [29] Latest report addresses digital transformation in blended learning environments. (2024). Retrieved from <https://education.ec.europa.eu/news/latest-report-addresses-digital-transformation-in-blended-learning-environments>.
- [30] Laurillard, D. (2012). *Teaching as a design science: Building pedagogical patterns for learning and technology*. New York: Routledge. doi: 10.4324/9780203125083.
- [31] Li, Y., Chen, D., & Deng, X. (2024). The impact of digital educational games on student's motivation for learning: The mediating effect of learning engagement and the moderating effect of the digital environment. *PloS One*, 19(1), article number e0294350. doi: 10.1371/journal.pone.0294350.

- [32] Liu, M., Ren, Y., Nyagoga, L.M., Stonier, F., Wu, Z., & Yu, L. (2023). Future of education in the era of generative artificial intelligence: Consensus among Chinese scholars on applications of ChatGPT in schools. *Future in Educational Research*, 1(1), 72-101. doi: [10.1002/fer3.10](https://doi.org/10.1002/fer3.10).
- [33] Majdi, H.S., Kzir, M.H., & Ghazi, M.A. (2024). [The impact of digital transformation on the educational environment of private universities](https://doi.org/10.1002/fer3.10). *Revista Iberoamericana de Psicología del Ejercicio y el Deporte*, 19(2), 238-241.
- [34] More than 48,000 Ukrainian teachers enrolled in UNESCO's "digital teacher" training. (2024). Retrieved from <https://www.unesco.org/en/articles/more-48000-ukrainian-teachers-enrolled-unescos-digital-teacher-training>.
- [35] Niță, V., & Guțu, I. (2023). The role of leadership and digital transformation in higher education students' work engagement. *International Journal of Environmental Research and Public Health*, 20(6), article number 5124. doi: [10.3390/ijerph20065124](https://doi.org/10.3390/ijerph20065124).
- [36] OECD. (2020). *Directorate for education and skills*. Retrieved from <https://www.oecd.org/en/about/directorates/directorate-for-education-and-skills.html>.
- [37] OECD. (2023). *Shaping digital education: Enabling factors for quality, equity and efficiency*. Paris: OECD Publishing. doi: [10.1787/bac4dc9f-en](https://doi.org/10.1787/bac4dc9f-en).
- [38] Oliynyk, N., Meleshchenko, O., & Morozova, O. (2025). Digital transformation of language education: Insights from the European DigiFLED project. *Studies in Comparative Education*, 1-2, 33-43. doi: [10.31499/2306-5532.1-2.2025.346718](https://doi.org/10.31499/2306-5532.1-2.2025.346718).
- [39] Pappas, I.O., Mikalef, P., Dwivedi, Y.K., Jaccheri, L., & Krogstie, J. (2023). Responsible digital transformation for a sustainable society. *Information Systems Frontiers*, 25, 945-953. doi: [10.1007/s10796-023-10406-5](https://doi.org/10.1007/s10796-023-10406-5).
- [40] Paul, J., et al. (2024). Digital transformation: A multidisciplinary perspective and future research agenda. *International Journal of Consumer Studies*, 48(2), article number e13015. doi: [10.1111/ijcs.13015](https://doi.org/10.1111/ijcs.13015).
- [41] Prylypko, V.M., Irkha, A.V., & Savastru, N.I. (2023). Professional development of scientific and pedagogical employees of higher education institutions of Ukraine in the context of digital transformation of education. *Prospects and Innovations of Science*, 14, 390-400. doi: [10.52058/2786-4952-2023-14\(32\)-390-400](https://doi.org/10.52058/2786-4952-2023-14(32)-390-400).
- [42] Punie, Y., & Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu*. Luxembourg: Publications Office of the European Union. doi: [10.2760/159770](https://doi.org/10.2760/159770).
- [43] Purwanto, A., Purba, J.T., Bernarto, I., & Sijabat, R. (2023). [Investigating the role digital transformation and human resource management on the performance of the universities](https://doi.org/10.1002/fer3.10). *International Journal of Data and Network Science*, 7.
- [44] Rolling plan for ICT standardisation. (2025). Retrieved from <https://interoperable-europe.ec.europa.eu/collection/rolling-plan-ict-standardisation/digital-learning-rp2025>.
- [45] Saeed, S., Altamimi, S.A., Alkayyal, N.A., Alshehri, E., & Alabbad, D.A. (2023). Digital transformation and cybersecurity challenges for businesses resilience: Issues and recommendations. *Sensors*, 23(15), article number 6666. doi: [10.3390/s23156666](https://doi.org/10.3390/s23156666).
- [46] Siemens, G. (2005). *Connectivism: A learning theory for the digital age*. Retrieved from <https://www.learning-theories.com/connectivism-siemens.html>.
- [47] Siemens, G., & Baker, R.S.J.d. (2012). Learning analytics and educational data mining: Towards communication and collaboration. In *LAK '12: Proceedings of the 2nd international conference on learning analytics and knowledge* (pp. 252-254). New York: Association for Computing Machinery. doi: [10.1145/2330601.2330661](https://doi.org/10.1145/2330601.2330661).
- [48] Singun, A. (2025). Unveiling the barriers to digital transformation in higher education institutions: A systematic literature review. *Discover Education*, 4, article number 37. doi: [10.1007/s44217-025-00430-9](https://doi.org/10.1007/s44217-025-00430-9).
- [49] Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S.V., Giannoutsou, N., Cachia, R., Mones, A., & Ioannou, A. (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Education and Information Technologies*, 28, 6695-6726. doi: [10.1007/s10639-022-11431-8](https://doi.org/10.1007/s10639-022-11431-8).
- [50] Trevisan, L.V., Eustachio, J.H.P.P., Dias, B.G., Filho, W.L., & Pedrozo, E.Á. (2024). Digital transformation towards sustainability in higher education: State-of-the-art and future research insights. *Environment, Development and Sustainability*, 26, 2789-2810. doi: [10.1007/s10668-022-02874-7](https://doi.org/10.1007/s10668-022-02874-7).
- [51] Ukraine: Digital transformation of education as a strategic path to resilience and innovation. (n.d.). Retrieved from <https://eurydice.iea.gov.ua/news/ukraine-digital-transformation-of-education-as-a-strategic-path-to-resilience-and-innovation/>.
- [52] UNESCO and MESU launch program on digital pedagogy, mental health and social and emotional education. (2023). Retrieved from <https://surl.li/ebuzif>.
- [53] UNESCO. (n.d.). *Education and justice: Learning to build just societies*. Retrieved from <https://surl.li/dpmhgz>.
- [54] Wang, C., Chen, X., Yu, T., Liu, Y., & Jing, Y. (2024). Education reform and change driven by digital technology: A bibliometric study from a global perspective. *Humanities and Social Sciences Communications*, 11, article number 256. doi: [10.1057/s41599-024-02717-y](https://doi.org/10.1057/s41599-024-02717-y).
- [55] Xu, Q., Li, X., & Guo, F. (2023). Digital transformation and environmental performance: Evidence from Chinese resource-based enterprises. *Corporate Social Responsibility and Environmental Management*, 30(4), 1816-1840. doi: [10.1002/csr.2457](https://doi.org/10.1002/csr.2457).

- [56] Zou, Y., Kuek, F., Feng, W., & Cheng, X. (2025). Digital learning in the 21st century: Trends, challenges, and innovations in technology integration. *Frontiers in Education*, 10, article number 1562391. [doi: 10.3389/feduc.2025.1562391](https://doi.org/10.3389/feduc.2025.1562391).

Олена Бокшиц

Кандидат історичних наук, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0002-3528-5312>

Василь Якуба

Кандидат історичних наук, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0002-2228-8522>

Цифрова трансформація освітнього середовища університетів: педагогічні виклики та соціальні наслідки

Анотація. Метою дослідження було комплексне обґрунтування цифрової трансформації вищої освіти. Методологія включала аналіз наукових джерел і стратегічних документів у сфері цифрової трансформації освіти, концептуалізацію ключових понять, порівняльний аналіз традиційної та цифрової моделей навчання, а також структурно-функціональне моделювання. Основні результати дослідження полягали в тому, що було системно узагальнено цифрову трансформацію освіти як багаторівневий процес, який одночасно охоплює педагогічний, технологічний та організаційний виміри функціонування університету. Було визначено та концептуально уточнено поняття «цифрове освітнє середовище університету» як інтегровану екосистему, що включає цифрові платформи, освітній контент, комунікаційні канали, адміністративні системи та учасників освітнього процесу, які взаємодіють у мережевій цифровій структурі. У результаті дослідження встановлено, що цифрова трансформація призводить до системної зміни ролей учасників освітнього процесу: викладач трансформується з носія знань у фасилітатора та дизайнера навчального середовища, а студент набуває статусу активного суб'єкта та співтворця знань. Виявлено, що ключовими характеристиками цифрового освітнього середовища є інтерактивність, гнучкість, доступність, персоналізація та технологічна опосередкованість. Доведено, що цифрові освітні технології (LMS, онлайн-платформи, відеокommунікація, інтерактивні інструменти) стають центральним елементом організації навчального процесу, забезпечуючи не лише передачу знань, а й управління навчанням, оцінювання, аналітику освітньої діяльності та формування індивідуальних освітніх траєкторій. Також було розроблено структурну модель цифрового освітнього середовища університету, яка підтверджує, що ефективність освітнього процесу залежить від інтеграції всіх компонентів у єдину цифрову систему, де взаємодія між елементами є безперервною, адаптивною та технологічно опосередкованою. Практичне значення результатів дослідження полягає у можливості їх використання для проєктування та вдосконалення цифрових освітніх середовищ у закладах вищої освіти, розробки стратегій впровадження змішаного та дистанційного навчання, а також підвищення ефективності управління освітнім процесом.

Ключові слова: технологічна опосередкованість; індивідуальні траєкторії; адміністративні системи; змішане навчання; освітній контент

**Inna Mysan***

PhD in Pedagogical Sciences, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0001-9416-4484>

Svitlana Demianenko

PhD in Pedagogical Sciences, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0002-0161-7024>

Play activity as a means of developing cognitive activity in preschool children

Abstract. The study aimed to determine the comparative effectiveness of different types of play activity in developing cognitive activity among preschool children. The study was conducted as a quasi-experimental empirical investigation using pedagogical observation, a formative experiment and comparative analysis. The sample comprised 90 children aged 5-6 years, divided into three groups according to the type of play activity and taught under a single methodological protocol. The findings showed that cognitive activity has an integrated structure, with interest predominating (57.8%) and with insufficient expression of independence (18.9%) and initiative (23.3%) at the initial stage. In the didactic games group, an increase was recorded in concentration (to 56.7%) and independence (to 43.3%), indicating a stronger ability among children to maintain focus on a task and complete an action without external support. In role-play games, an increase was observed in questioning activity (to 53.3%) and initiative (to 50.0%), accompanied by a shift towards the independent development of play-based interaction. In the physical games group, the changes were limited and mainly concerned general involvement, without a significant effect on the structural components of cognitive activity. The comparative analysis showed a higher proportion of children with a high level of cognitive activity in the didactic games group (46.7%) and the role-play group (43.3%) than in the physical games group (30.0%). The practical significance of the study lies in the possibility of using the findings to select play-based forms of activity in preschool education institutions: didactic games for developing concentration and independence, role-play games for strengthening initiative and questioning activity, and physical and free-play activities for maintaining children's general involvement

Keywords: interest; initiative; concentration; independence; interaction; dynamics; organisation

INTRODUCTION

The relevance of the study is determined by the need in preschool education for pedagogical tools that stimulate children's active cognition, rather than merely the assimilation of ready-made information. In preschool age, children develop an interest in new things, the ability to ask questions, concentrate on a task and search for solutions independently. The development of cognitive activity, therefore, requires specially organised activities that

correspond to children's age-related capabilities. Play activity is one of the most natural means of such development, as it combines cognitive content with a form of action accessible to preschool children. Through play, children show initiative, interact with peers, make decisions and test different ways of completing tasks. The research problem lies in the fact that, in preschool education practice, play is often used in a generalised way, without a clear

Suggested Citation:

Mysan, I., & Demianenko, S. (2026). Play activity as a means of developing cognitive activity in preschool children. *Scientia et Societis*, 5(1), 70-85. doi: 10.69587/ss/1.2026.70.

*Corresponding author (mysan.iv79@gmail.com)



distinction between its types and pedagogical outcomes. In this context, it is important to determine how didactic, role-play, and physical/free-play activities influence individual components of preschool children's cognitive activity.

Studies of the cognitive activity of older preschool children have established its multicomponent structure, in which interest, initiative and independence play a key role. In the study by T. Ponomarenko & O. Kuzina (2023), the cognitive activity of older preschool children was described as a multicomponent formation, with interest, initiative and independence identified as its central elements. The study showed that these components developed unevenly: a child's interest in a task was not always accompanied by readiness to act independently. In a later study, T. Ponomarenko & O. Kuzina (2025) shifted the focus to the pedagogical conditions for developing cognitive activity. The authors demonstrated that the stability of positive changes depended on the educator's preparedness for purposeful support, through which situational interest developed into more stable cognitive engagement. This line of reasoning was further developed in studies focusing on specific means of activating cognition. In the context of mobile play technologies, N. Bakhmat *et al.* (2025) identified a statistically significant relationship between digital play and children's cognitive development. The most notable changes concerned attention and the speed of information processing; however, the effect on initiative and independence was less pronounced, indicating that different play formats have an uneven impact. A similar conclusion was reached in a study of interactive methods for preparing preschool children for school. H. Vatamaniuk *et al.* (2024) found that combining play with other active forms of work increased the level of material assimilation and supported the development of basic cognitive functions. At the same time, the outcome depended on the degree to which the activity was structured, which again underlined the importance of pedagogical organisation. A separate aspect of this issue was examined through pedagogical support for children living in difficult life circumstances. O. Nehrii *et al.* (2025) showed that play activity performed a stabilising function and helped restore cognitive activity. However, the effectiveness of this influence was determined not by the mere presence of play, but by the coherence of pedagogical actions and the integrity of the supportive environment.

The importance of guiding play was specified in studies devoted to the organisation of play activity. N. Marievych *et al.* (2022) concluded that unguided play did not ensure the stable development of cognitive indicators, whereas pedagogically guided play activity produced a more pronounced result. This made it possible to interpret play as a developmental resource only when its content and methodology were properly organised. The issue of preparing educators for such organisations was further developed in the context of gamification in professional education. T. Koval *et al.* (2024) found that the use of game mechanics in the training of future educators strengthened their ability to organise children's learning activities. The results

indicated a connection between educators' professional skills and the quality of stimulation of preschool children's cognitive activity. The potential of play was expanded in studies in which it was combined with other developmental practices. O. Budnyk *et al.* (2025) demonstrated that the integration of play technologies with art-therapeutic tools enhanced children's cognitive development and emotional involvement. This finding showed that play may be more effective when combined with practices that support emotional state and creative self-expression.

In the digital educational environment, the issue of child development has been examined through the development of soft skills and interaction with the surrounding environment. L. Lokhvytska *et al.* (2025) found that e-learning stimulated the communicative activity and adaptability of six-year-old children. At the same time, its influence on deeper cognitive processes was indirect, indicating the need to combine digital formats with direct play-based interaction. Evidence of the effectiveness of digital play pedagogy was also obtained in a quasi-experimental study of preschool cognitive development. V.J. Clemente-Suárez *et al.* (2024) examined the impact of digital device use on children's cognitive development and showed that the digital environment may affect specific cognitive abilities in different ways. It was also emphasised that the effect depended not only on the use of devices themselves, but also on the nature of digital interaction.

The analysis of these studies showed that the academic literature contains a substantial body of evidence on the role of play activity in children's development. At the same time, the comparative effectiveness of different types of play, as well as their influence on individual components of cognitive activity under the conditions of a standardised pedagogical experiment, remained insufficiently explored. There was not enough evidence to compare didactic, role-play and free-play activities within a single research framework. The study aimed to determine the influence of different types of play activity on the development of cognitive activity in preschool children and to establish their comparative effectiveness.

MATERIALS AND METHODS

The study of preschool children's cognitive activity was conducted as a quasi-experimental empirical investigation of its structure and dynamics under different types of play activity. The methodological model combined theoretical analysis, pedagogical observation, a formative experiment and comparative analysis of the results. The empirical base consisted of preschool education institutions in the cities of Uman, Vinnytsia and Kyiv, selected to cover urban educational environments of different scales and to enable cross-institutional testing of a single methodological protocol (Preschool Educational Institution..., n.d.; Municipal Institution "Preschool...", n.d.; Preschool Education Institution (Nursery..., n.d.). The study involved 90 children aged 5-6 years. The preliminary distribution of children by levels of cognitive activity was carried out using standardised

pedagogical observation sheets, which recorded interest, initiative, questioning activity, concentration and independence on a three-level scale: high, medium and low. In each institution, three subgroups of 10 children were formed. Each subgroup worked with a different type of play activity: didactic games, role-play games, or physical/free-play activities. In total, each type of play activity included

30 children from the three cities. This distribution made it possible to compare the results under the same initial conditions, without moving children between institutions and without overloading the existing age groups. The experiment was implemented according to a single methodological protocol, which ensured the comparability of the results regardless of location (Table 1).

Table 1. Matrix of the single methodological protocol of the study

Protocol component	What was standardised	How it was implemented in all preschool education institutions
Organisation of sessions	Frequency, duration and time of delivery	Three times a week, 25-30 minutes, in the first half of the day
Session structure	Sequence of pedagogical actions	Introductory motivation, explanation of rules, main game and brief concluding discussion
Type of play activity	Assignment of forms of play to groups	Didactic, role-play and physical/free-play activities were not combined within a single experimental condition
Play scenarios	Content and rules of the games	Identical scenarios with uniform instructions for educators were used
Didactic materials	Tools, cards, objects and play sets	Identical or functionally equivalent materials were used
Assessment criteria	Indicators of cognitive activity	Interest, initiative, questioning activity, concentration and independence were assessed
Assessment scale	Levels of indicator manifestation	Three levels were used: high, medium and low
Data recording	Method of collecting results	Standardised pedagogical observation sheets were completed
Educator preparation	Shared understanding of the procedure	Joint instruction was provided before the experiment began
Implementation control	Compliance with the protocol	Selective checks of observation sheets and periodic video recording of sessions were carried out with parental consent

Source: created by the authors

The study was coordinated centrally. Educators who were already working with the relevant age groups and had at least three years of teaching experience took part in the experiment on a voluntary basis. They received instructional and methodological materials in electronic format by email and through a shared cloud repository. The package included a description of the types of games, session scenarios, time parameters, assessment criteria and observation sheets. The didactic sessions included the games “Find the odd one out” (Vseosvita, 2021), “What has changed?” (Vseosvita, 2024a) and “Continue the sequence” (Vseosvita, 2024b). These involved work with cards, object images and tasks requiring comparison, classification, memorisation of changes, identification of patterns and selection of the next element according to a given logic.

Before the formative stage, remote instruction was provided by videoconference. During this session, the procedure for conducting the activities and the rules for recording the results were agreed upon. The experiment was conducted in parallel in all institutions over 8 weeks according to the same schedule: 3 sessions per week, each lasting 25-30 minutes, in the first half of the day. The type of play activity was assigned to a specific group and remained unchanged throughout the formative stage. To ensure equal conditions, identical or functionally similar didactic materials were used, the instructions for the games were reproduced without alteration, and the session structure

was unified, consisting of introductory, main and concluding parts. The results were recorded by educators directly during the sessions using standardised observation sheets. The integral level of cognitive activity was determined according to the ratio of five components: interest, initiative, questioning activity, concentration and independence. The leading dynamics were identified through those indicators in which the largest increase in the proportion of children with a high level was recorded after the formative stage. To increase reliability, one session in each subgroup was randomly selected once a week for video recording, subject to parental consent, and some observation sheets were selected by random sampling for double assessment by another educator or researcher. The completed forms were sent to the research coordinator electronically through a secure cloud repository and duplicated by email. The data obtained from different cities were combined into a single database for subsequent comparative analysis between the groups. The methodological limitations of the study were determined by the sample size ($n=90$), its age homogeneity, reliance on pedagogical observation as the main tool for data recording, and the eight-week duration of the formative stage, which did not include assessment of the long-term effects of play activity.

The ethical organisation of the study complied with national and international regulatory and ethical requirements, including the Order of Ministry of Education and

Science of Ukraine No. 552 (2023), the Law of Ukraine No. 2402-III (2001), the United Nations (1989), the Law of Ukraine No. 2297-VI "On Personal Data Protection" (2010), the British Educational Research Association (2024) and the UNICEF (2021). Compliance with these requirements was ensured by obtaining informed consent from the children's parents or legal representatives, voluntary participation, the right to withdraw at any stage, data confidentiality, the prevention of psychological discomfort, and the delivery of activities in the children's usual educational environment. Video recording was carried out only with separate written parental consent, and all results were processed in aggregated form without identifying the children.

RESULTS

Structural organisation

of preschool children's cognitive activity in play activity

Preschool children's cognitive activity appears as an integral formation that combines interest in the activity, initiative, the ability to ask questions, concentration and independence (da Silva, 2025). These components do not function in isolation; rather, they are interrelated and change depending on the nature of the activity and the conditions in which it is organised. In a play environment, this interaction acquires a particularly dynamic character, since play creates situations of choice, variation in actions and direct child involvement in the process of cognition. At the same time, the expression of individual components is not uniform, which requires clarification of their ratio and initial level of development in children from different groups. This makes it possible to specify the structural characteristics of cognitive activity through its actual manifestations in activity.

Preschool children's cognitive activity is therefore understood as an integrated formation encompassing interest, initiative, questioning activity, concentration and independence. This interpretation defines it not as children's general involvement in an activity, but as a system of observable manifestations through which preschool children's readiness to learn, act, clarify and find solutions independently is expressed. Interest became the initial condition for such activity, as it ensured the child's emotional acceptance of the task and involvement in the play situation. The desire to take part in the game, respond to new content and maintain contact with the educator and peers created the basis for further cognitive action. At the same time, interest was not a sufficient indicator of developed activity, since it could remain a situational response to attractive material. The further development of cognitive activity was associated with initiative, which indicated a shift from emotional involvement to the child's own action. Whereas interest ensured readiness to enter the activity, initiative revealed the preschool child's ability to influence its content: to suggest ways of completing the task, change the course of the game, take on a role or independently choose a way of acting. Through this component, the child's participation ceased to be merely a response to an

adult's instruction. An initiative-taking position, in turn, strengthened questioning activity. Questions arose when the child not only accepted the rules of the game, but also tried to understand them more deeply, clarify a rule, identify a cause or find another way of acting. Questioning activity, therefore, reflected not the number of verbal responses, but the child's orientation towards cognitive clarification of the situation.

For these manifestations not to remain fragmentary, concentration became essential. It ensured the duration and stability of cognitive activity, made it possible to keep attention on the task, avoid interrupting the action because of incidental stimuli and bring it to completion. As a result, initial interest, initiative and questions developed into consistent activity. Independence was the most generalised manifestation of cognitive activity. It combined motivational, cognitive and behavioural components, as it involved the ability to act without constant adult assistance, choose a method of completion, monitor the result and correct mistakes. Independence showed that cognitive activity had moved beyond externally supported participation and had acquired the nature of the child's own activity (Chen & Ding, 2024). The separate definition of the components of cognitive activity made it possible to clarify their content. However, a full understanding of this phenomenon required an explanation of how these components were related to one another in play activity. It was the interaction between interest, initiative, questioning activity, concentration and independence that determined the actual nature of a preschool child's cognitive behaviour.

In the context of play activity, the components of cognitive activity form a functional system in which each element has its own purpose. Interest ensures the child's involvement in the play situation, initiative determines the child's active position, questioning activity directs cognitive exploration, concentration sustains the duration of the activity, and independence indicates the degree to which the activity has been internally accepted. The connection between interest and initiative is conditional. Interest creates a prerequisite for active participation, but it does not always develop into the child's own initiative. If the game remains overly regulated, the child may remain interested but act mainly within the limits of the instruction. In situations involving choice, an open-ended task or role development, interest is more likely to develop into the independent proposal of actions. Questioning activity is most clearly linked to initiative. Questions arise when the child not only perceives the conditions of the game, but also seeks to clarify, change or expand them. In this sense, questions do not perform an auxiliary function, but a cognitive and organisational one: through them, the child builds an independent understanding of the situation and influences the subsequent course of the activity. Concentration supports the implementation of the other components. Without sufficient concentration, interest quickly loses stability, initiative becomes fragmentary, and questions do not develop

into completed action. The most stable manifestations of concentration arise when the play task has a clear purpose, corresponds to the child's capabilities, and, at the same time, contains an element of exploration. Independence depends on the coherence of the preceding components. It is not formed simply by giving the child freedom of action, since it requires motivational involvement, a clear task, sufficient attention and the possibility of choice. In play, independence becomes evident when the child can make decisions within the rules and see the result of their own action. Cognitive activity in play had a systemic organisation, as its development was determined by the coherence of several conditions: the emotional appeal of the play situation, sufficient cognitive complexity, the possibility of choice and the completion of the action. It was the combination of these factors that made it possible to distinguish

the child's situational external involvement from stable cognitive activity, expressed in conscious engagement in play, sustained interest, independent choice of actions and the desire to achieve a result (Maria & Sumantri, 2025). Baseline indicators were recorded using a single-level scale (high, medium and low) based on standardised observation sheets, which ensured the comparability of results across institutions in Uman, Vinnytsia and Kyiv. In each institution, observation was carried out in three subgroups of 10 children, assigned to different types of play activity. The primary data, therefore, reflected not only the general state of the sample but also the comparability of the subgroups before the formative stage began. The initial assessment made it possible to determine the baseline state of preschool children's cognitive activity before the introduction of different types of play activity (Table 2).

Table 2. Initial distribution of children by levels of cognitive activity

Level of cognitive activity	Number of children	Share of the total sample, %
High	18	20.0
Medium	49	54.4
Low	23	25.6
Total	90	100.0

Note: the share of children was calculated as a percentage of the total number of participants (n = 90) for each level of cognitive activity

Source: compiled by the authors

The predominance of the medium level indicated the presence of basic cognitive involvement, although its manifestations were not yet sufficiently stable. For a considerable proportion of the children, activity remained dependent on external adult support, confirming the need for targeted pedagogical influence through play activity. Comparison of baseline

indicators by urban location made it possible to assess whether institutional or regional factors affected the children's initial level of cognitive activity. Since all three types of play activity were represented in each city, this analysis performed a control function and confirmed the validity of subsequent comparison, specifically by type of play (Table 3).

Table 3. Initial distribution of children by levels of cognitive activity across urban locations

City	High level, n (%)	Medium level, n (%)	Low level, n (%)	Total
Uman	6 (20.0)	16 (53.3)	8 (26.7)	30
Vinnytsia	7 (23.3)	15 (50.0)	8 (26.7)	30
Kyiv	5 (16.7)	18 (60.0)	7 (23.3)	30
Total	18 (20.0)	49 (54.4)	23 (25.6)	90

Note: percentages were calculated as the proportion of children at a given level out of the total number of participants in the corresponding urban location. In each city, the sample included three subgroups of 10 children according to the type of play activity

Source: summarised by the authors

The closeness of the values across the three urban locations indicated the absence of marked differences between the children at the initial stage according to institutional affiliation. This comparability of indicators confirmed the consistency of the sample and provided a basis for further analysis of the influence of different types of play activity, as each type was represented in every city. The component-based cross-section offered a more precise explanation of the general distribution of levels. The strongest element of cognitive activity was interest in the activity: more than half of the children demonstrated a high level of interest – 52 children (57.8%). This meant that most preschool children willingly entered the play situation, responded positively to new tasks and maintained emotional

involvement. However, this indicator did not directly translate into initiative: only 21 children (23.3%) independently suggested ways of acting or changed the course of the game, whereas in 28 children (31.1%) this component remained at a low level.

Questioning activity occupied an intermediate position between emotional involvement and independent action. A high level was recorded in 24 children (26.7%), a medium level in 39 children (43.3%) and a low level in 27 children (30.0%). This indicated that questions mainly arose in response to difficulties or the need to clarify rules, but had not yet become a stable form of cognitive exploration. Concentration proved to be more stable: 31 children (34.4%) maintained attention at a high level, 40 children

(44.4%) at a medium level, while 19 children (21.1%) quickly lost concentration. Independence remained the most problematic component. Only 17 children (18.9%) demonstrated a high level, whereas a low level was recorded in 37 children (41.1%). This showed that initial interest in the game did not always develop into the ability to act without adult support, choose a method of completion and control the result of one's own action. The ratio of components clarified the internal structure of cognitive activity at the initial stage. Interest predominated as the leading component, ensuring involvement in the activity; however, it did not develop to the same extent into initiative and independence. Questioning activity and concentration occupied an intermediate position, supporting the cognitive process but not ensuring its completeness. Independence remained the most vulnerable element, limiting the integrity of cognitive activity. At the ascertaining stage, a heterogeneous structure of cognitive activity was recorded, in which the predominance of interest was combined with insufficient expression of independence and initiative. The obtained indicators provided a basis for further analysis of the influence of different types of play activity on the individual components of this formation.

Didactic games as a factor in the development of the cognitive components of cognitive activity

Didactic games are an effective means of influencing the cognitive components of cognitive activity because they combine play motivation with clearly organised activity content (Vahlo *et al.*, 2022). Their specificity lies in the fact that cognitive tasks are presented through a structured system of rules and actions, which directs the child's activity and reduces randomness in task completion. Under such conditions, interest in the game is supplemented by the need to perform mental operations, ensuring deeper involvement in the cognitive process. This makes it possible to regard didactic games as a form of activity in which attention, thinking and concentration are not only manifested, but also acquire a more stable and purposeful character. A didactic game is a form of organising cognitive activity in which educational content is presented through rules, a play-based condition and an expected result. Its distinctive feature is that the child becomes involved in the task not through direct instructional teaching, but through the need to act within a clear play situation. As a result, cognitive action acquires practical meaning for the preschool child. In the structure of a didactic game, the cognitive aim does not exist separately from the play motive. It is expressed through specific operations that the child performs during play: comparing objects, identifying shared and distinctive features, classifying objects, establishing a sequence or determining a causal link. For this reason, such games provide not only emotional involvement, but also organised mental activity.

For example, in the game "Find the odd one out" (Vseosvita, 2021), the child was presented with a series of cards containing four images, three of which shared a common

feature, while one did not belong to the group. The child had not only to name the odd item, but also to explain the basis for the choice: colour, shape, function, material or belonging to a particular category. This game activated the operations of comparison, classification and generalisation. In the game "What has changed?" (Vseosvita, 2024a), children first examined a set of objects or images, after which one element was removed, replaced or moved to a different position. The task was to recall the previous arrangement and identify the change, which developed visual memory, attention to detail and the ability to retain an image in mind. In the game "Continue the sequence" (Vseosvita, 2024b), children had to identify the pattern in the alternation of objects and independently select the next element, which supported the development of logical thinking, analysis and prediction. These games show that the didactic form creates a guided cognitive situation for the child. In this situation, the result depends not on random activity but on the correct performance of a mental operation. For this reason, participation in the game gradually moves from a simple response to the material towards a conscious choice of a method of action. The structured nature of a didactic game is of fundamental importance for the development of cognitive activity. A clear sequence of "condition – action – result" helps the child understand the aim of the task, maintain attention and relate their own actions to the expected outcome. Under these conditions, cognitive activity acquires a directed character: the child not only participates in the game, but also performs a specific intellectual task that supports the development of attention, thinking, concentration and independence.

The structured tasks embedded in didactic games determine the specific nature of their influence on the cognitive components of cognitive activity. Their organisation reduces randomness in children's actions and gives the cognitive process a clear direction. As a result, the child's attention is focused on performing a specific operation and monitoring its outcome. Attention becomes more stable in the context of a didactic game. A clear aim and an understandable result reduce distractions and sustain interest throughout the task. The child concentrates not only at the beginning of the game, but also during its course, since each action affects the final outcome. Thinking is directly linked to the nature of the tasks. Performing actions according to a model, searching for patterns, and identifying similarities and differences activate analysis, synthesis, generalisation and classification. The structured nature of the task ensures the sequence of mental actions: the child focuses on the condition, relates the elements to one another and checks the result. Concentration is supported through a combination of clear rules and the need to complete the action. The most stable concentration occurs when the task corresponds to the child's abilities while also containing an element of exploration. Excessive complexity or oversimplification reduces concentration; therefore, the selection of game content is of fundamental importance (Shaheen *et al.*, 2024). Thus, structured tasks in didactic games ensure

the coordinated interaction of cognitive processes. Attention supports performance, thinking determines the method of action, and concentration ensures its completion.

The structured nature of didactic games had the most pronounced effect not on the children's initial interest in the activity, but on their ability to maintain focus on the task and complete it with less adult assistance. This was explained by the logic of the didactic game itself: the child worked with a rule, a sequence of actions and a verifiable

result. Changes, therefore, appeared primarily in concentration and independence. At the formative stage, the most noticeable changes in the didactic games group concerned concentration and independence. Structured tasks helped children retain instructions more often, complete actions, and require less constant adult support. The dynamics of independence were particularly indicative, as this component had been less developed at the outset and depended most strongly on pedagogical support (Fig. 1).

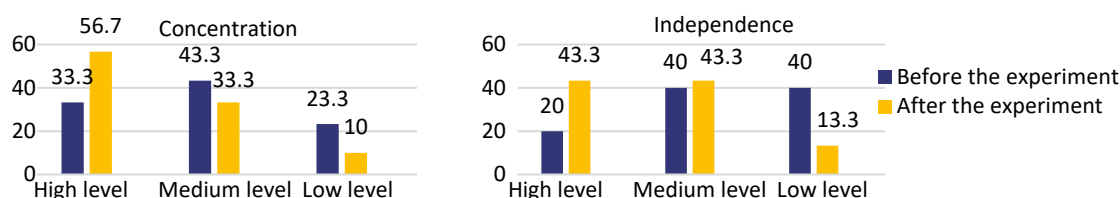


Figure 1. Dynamics of concentration and independence in the didactic games group, %

Notes: percentages were calculated from the total number of children involved in didactic games across the three urban locations (n = 30; 10 children in each institution)

Source: compiled by the authors

Didactic games primarily strengthened the regulatory aspect of cognitive activity. After the formative stage, the children not only became more actively involved in the tasks, but also maintained their logic more effectively, acted more consistently and required external prompts less often. The most important result was a decrease in unstable manifestations: cognitive action was more often completed independently, rather than interrupted because of loss of attention or uncertainty about how to perform the task. This confirmed that didactic games had a stronger effect on the organisation of cognitive behaviour than on the spontaneous expansion of initiative.

Role-play as an environment for developing initiative and cognitive interaction

Role-play is a form of activity in which cognitive activity develops through children's interaction within an imaginary situation. Its content is determined not by a predetermined task, but by the joint construction of a play space in which each action gains meaning in the context of the role and interaction with others. Under these conditions, cognition is not limited to the performance of individual operations, but includes understanding the situation, clarifying conditions, coordinating actions and explaining one's own decisions. This changes the nature of cognitive activity: it becomes more open, variable and dependent on the communicative process (Delfin & Wang, 2023). Initiative and questioning activities become particularly important, as they ensure the development and maintenance of play-based interaction. Role-play appeared as a form of activity in which cognition occurred through interaction with other participants and the reproduction of social situations. Unlike didactic games, where the cognitive task was set through a rule and an outcome, in role-play, the content of the activity was formed as the imaginary

situation unfolded collectively. This meant that cognitive activity was not predetermined, but emerged and changed during interaction.

Cognition within such play acquired a mediated character. The child did not work directly with learning material, but acted through a role, which shaped the way of perceiving, evaluating and responding. The content of cognitive activity was determined not by a separate task, but by the logic of the play situation: the need to reach agreement, clarify conditions, explain one's own actions or understand the actions of another child. As a result, cognitive processes became embedded in communication and acquired social meaning. Social mediation was also evident in the fact that the child's activity depended on the positions of other participants. Each action required consideration of roles, rules of interaction and partners' expectations. This created conditions in which cognitive activity moved beyond individual performance and became part of a shared process. The child not only performed their own role, but also related it to the actions of others, which required constant clarification and adjustment. Within role-play, cognition did not have a fixed outcome, which distinguished it from structured forms of activity. The process of interaction became more important than the final result: how the child understood the situation, what questions they asked, how they built dialogue and how they responded to changing conditions. For this reason, cognitive activity acquired an open character and was not limited to the performance of a predetermined action. Thus, role-play outlined a different model of cognition, in which the leading factor was not operational accuracy, but the ability to navigate a social situation, understand another person's position and build one's own line of behaviour. This feature determined its potential for developing initiative and cognitive interaction.

The imaginary situation served as the central element of role-play, as it set the content of the activity and determined the direction of cognitive activity. The child acted not in real conditions, but in a modelled environment in which every object, action or event acquired a conditional meaning. This required the constant correlation of real experience with the play situation and active reflection on what was happening. The development of cognitive initiative was directly linked to the openness of the imaginary situation. Unlike structured tasks, it did not restrict the child to a clear algorithm of actions. This created space for independently determining the content of the game: children suggested how events might develop, changed the plot, introduced new elements or clarified existing ones. In this case, initiative was expressed not as a response to a task but as the ability to develop the activity independently. The distribution of roles provided the structural basis for this activity. Each role defined the child's position, functions and ways of interacting. Taking on a role required an understanding of its content, rules of behaviour and the expectations of other participants. This encouraged the child to interpret the situation actively: it was necessary not only to act, but also to explain one's own actions, coordinate them with partners and adjust them as the plot developed. Cognitive initiative was formed through this process of coordination. The child asked questions, clarified details and suggested changes or additions to the game. These actions were not externally assigned, but arose from the

need to sustain the play situation. This is why initiative in role-play acquired a more spontaneous and variable character than in didactic forms of play. The development of cognitive initiative was also supported by changes in roles and situations. Moving from one role to another required reorientation to new conditions, which strengthened flexibility of thinking and the ability to adapt to change. This broadened the range of cognitive actions and created additional opportunities for initiative to emerge. Thus, the imaginary situation and the distribution of roles determined the specific nature of cognitive initiative development in role-play. It was expressed through the child's ability to develop the content of the activity independently, interact with other participants and sustain the development of the play situation without external regulation. The openness of the imaginary situation and the need to coordinate actions within roles created conditions in which changes appeared primarily in the components directly related to initiating interaction. In the combined role-play group, formed from three subgroups of 10 children in different urban locations ($n = 30$), the dynamics focused not on the stabilisation of performance, but on the development of cognitive dialogue: children asked questions more often, clarified the conditions of the game and suggested possible developments in the plot. The dynamics of questioning activity and initiative reflected changes not only in the number of manifestations, but also in children's participation in role-play (Table 4).

Table 4. Dynamics of questioning activity and initiative in the role-play group

Component	Stage	High level, n (%)	Medium level, n (%)	Low level, n (%)
Questioning activity	Initial	8 (26.7)	13 (43.3)	9 (30.0)
Questioning activity	Control	16 (53.3)	10 (33.3)	4 (13.3)
Initiative	Initial	7 (23.3)	14 (46.7)	9 (30.0)
Initiative	Control	15 (50.0)	11 (36.7)	4 (13.3)

Note: percentages were calculated from the total number of children involved in role-play games across the three institutions ($n = 30$; 10 children in each urban location)

Source: compiled by the authors

The data show that role-play had the strongest effect on the components associated with the communicative development of activity. Children's questions more often served to clarify, coordinate and develop the plot, while initiative was expressed through the proposal of roles, new actions and alternative directions for the game. Comparison with other types of play activity clarified the nature of these changes. In the didactic games group, the increase in initiative was more moderate, as the activity remained limited by the rules and structure of the task. In the physical games group, activity was expressed mainly as involvement in the action, but did not develop into cognitive clarification or the expansion of content. By contrast, in role-play, interaction itself became the source of cognitive activity, which accounted for the higher indicators of questioning activity and initiative. The analysis of the organisation of activity showed that the changes affected not only individual indicators, but also the way children interacted.

During play, situations were increasingly observed in which children distributed roles independently without adult intervention, agreed on the rules of the game within the group and maintained the game's logic through discussion. The children themselves decided who would perform each function, agreed on the sequence of actions and adjusted it according to the development of the plot. One manifestation of these changes was the emergence of collective planning. By the end of the formative stage, some children, approximately 40.0%, were observed discussing in advance how the game would unfold, which roles would be involved and which actions would be performed. This indicated a shift from situational interaction to a more organised form of activity, in which cognitive activity was combined with elements of self-regulation. Thus, role-play changed the nature of cognitive activity by strengthening its social dimension. The increase in questioning activity and initiative was accompanied by a transition towards

a more independent organisation of activity, in which the child acted not only as a performer of a role, but also as a participant in the joint construction of a cognitive situation.

Physical and free-play activities as a means of maintaining children's general involvement

Physical and free-play activities differed from didactic and role-play games in their lower degree of structure and weaker orientation towards the performance of a specific cognitive task. This feature determined a different type of influence on children's cognitive activity. Whereas in didactic games the child acted within a clearly defined rule, and in role-play within an imaginary social situation, in physical and free-play activities, the process of participation itself became dominant. Action was more often determined by a rapid response, changes in play conditions, imitation of other children's movements and maintenance of the group's general pace. For this reason, the cognitive component in such games appeared indirectly: not through the performance of a special task, but through orientation in the situation, acceptance of rules, response to signals and coordination of one's own behaviour with the actions of peers. Their developmental potential was linked above all to maintaining emotional involvement, activity, readiness for interaction and a positive attitude towards shared activity. In this case, emotional involvement served as the initial condition for cognitive activity, since the child entered the activity more willingly, accepted the rules more easily and responded more quickly to changes in the play situation. At the same time, such involvement did not always develop into more complex forms of cognitive behaviour. The child could move actively, maintain contact with the group and show interest in the game, but not necessarily ask questions, plan an action independently or sustain a cognitive task for a prolonged period. Physical and free-play activities should therefore be regarded as a form of maintaining the general level of activity, rather than as the main means of developing all components of cognitive activity.

In such games, the child responded more quickly to the situation, became involved in the action and followed the general rhythm of the group, but did not always move towards independent cognitive exploration or sustained engagement with the task. This was because the content of physical or free play often did not require a sequential analysis of conditions, the choice of a method of solution or verification of the result. The child's main attention was directed towards participation in a shared action, maintaining the pace, coordinating movements and responding quickly to changes in the situation. These manifestations were important for children's general activation, but they did not provide sufficient duration of cognitive effort. For this reason, the influence of this group of games was expected to be more evident at the level of interest and involvement than at the level of independence or concentration. Within the experiment, physical and free-play activities were treated as separate conditions, making it possible to examine the extent to which children's general activation could influence the cognitive sphere. This group was not expected to show the same pronounced increase in cognitive or regulatory components as the didactic games group, since the tasks did not have a stable object-based and logical structure. Nor was the development of questioning activity and initiative expected to be as active as in role-play games, where children's interaction required constant clarification of the content of the game. The main expected outcome was an increase in interest, readiness to participate and a reduction in passive manifestations. At the formative stage, in the physical/free-play group, formed from three subgroups of 10 children in different urban locations ($n = 30$), the most noticeable changes concerned interest and general involvement. The children participated more willingly in shared play actions, responded more quickly to changes in conditions and showed a positive emotional response to the play situation. At the same time, the increase in independence, concentration and questioning activity was less pronounced than in the didactic and role-play groups (Table 5).

Table 5. Dynamics of individual components of cognitive activity in the physical/free-play group

Component	Stage	High level, n (%)	Medium level, n (%)	Low level, n (%)
Interest	Initial	17 (56.7)	9 (30.0)	4 (13.3)
Interest	Control	20 (66.7)	8 (26.7)	2 (6.7)
Concentration	Initial	10 (33.3)	13 (43.3)	7 (23.3)
Concentration	Control	12 (40.0)	12 (40.0)	6 (20.0)
Independence	Initial	6 (20.0)	11 (36.7)	13 (43.3)
Independence	Control	8 (26.7)	12 (40.0)	10 (33.3)

Note: percentages were calculated from the total number of children involved in physical/free-play activities across the three urban locations ($n = 30$; 10 children in each institution)

Source: compiled by the authors

The most noticeable change was the increase in the high level of interest from 56.7% to 66.7%. This confirmed that physical and free-play activities effectively supported the emotional and motivational components of cognitive

activity. The decrease in the proportion of children with a low level of interest from 13.3% to 6.7% also indicated reduced passivity and greater readiness to engage in the play process. However, the nature of this increase was mainly

general: the children responded more actively to the game and participated more willingly in shared actions, but this was not always accompanied by greater complexity in cognitive behaviour. The summary of the obtained indicators provided grounds for defining physical and free-play activities as a form of mainly supportive influence on preschool children's cognitive activity. They created a favourable emotional background, increased children's readiness to participate in activities and reduced passivity. However, they did not provide the same level of structured cognitive advancement as didactic games, nor did they stimulate the development of questions and initiative as actively as role-play games. This was because physical/free play required, to a lesser extent, the maintenance of a cognitive task, explanation of the method of action or independent planning of play content. Its effect was therefore moderate and concerned primarily with children's general involvement in the play process.

Comparative effectiveness of different types of play activity

Comparison of the results makes it possible to regard play activity as a system of forms with different directions of influence on cognitive activity. The differences between didactic, role-play and physical/free-play activities are related to the way the activity is organised, the degree of its structure and the nature of children's interaction. This results in different dynamics of change, both at the level of individual components and at the overall level of cognitive activity. The comparison of results obtained in the three experimental groups, each formed from subgroups represented in all urban locations, together with the analysis of the dynamics of individual components of cognitive activity, made it possible to specify the nature of the influence of different types of play activity and to determine their functional orientation in the development of preschool children (Table 6).

Table 6. Comparative dynamics of cognitive activity by type of play activity

Indicator	Didactic games	Role-play games	Physical/free-play activities
Overall, the high level after the experiment	46.7%	43.3%	30.0%
Low level after the experiment	10.0%	13.3%	23.3%
Leading dynamics	Concentration increased; independence increased	Initiative increased; questioning activity increased	Interest increased moderately
Nature of changes	Organisation of activity	Development of interaction	Maintenance of activity

Note: percentages for each type of play activity were calculated from the number of children in the corresponding experimental group ($n = 30$), which included 10 children from each urban location

Source: summarised by the authors

Didactic games provide the most pronounced influence on the regulatory components of activity, whereas role-play games have the strongest effect on communicative and initiative-related components. Physical and free-play activities show limited dynamics, mainly maintaining

the level of general involvement. The integral assessment of changes made it possible to compare the overall level of cognitive activity in the three experimental groups after the formative stage, with each group including children from the three urban locations (Fig. 2).

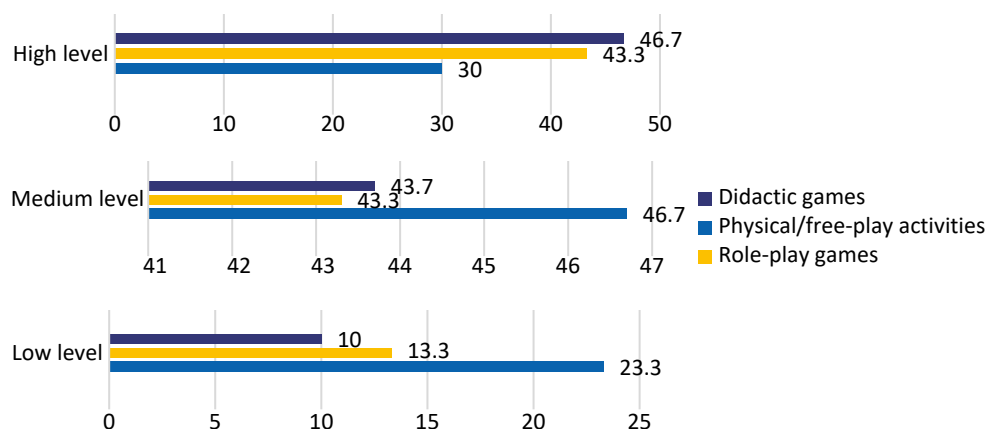


Figure 2. Integral dynamics of levels of cognitive activity by type of play activity, %

Source: compiled by the authors

The most pronounced increase in the high level of cognitive activity was observed in the groups where play had a clear pedagogical orientation or involved meaningful

interaction between children. Didactic games strengthened the organisation of cognitive action, whereas role-play games enhanced initiative and the communicative

development of activity. Physical and free-play activities mainly supported general involvement, but to a lesser extent ensured the transition to stable cognitive activity. The results show that the effectiveness of play activity is determined not by the mere fact of its use, but by the conditions of its organisation. Didactic games organise cognitive behaviour through a clear task structure and the requirement to complete an action. Role-play games develop initiative and cognitive interaction through the openness of the situation and the need to coordinate actions. Physical and free-play activities support general activity, but do not ensure a stable transition to a higher level of cognitive activity. Taken together, these results confirm the appropriateness of using play forms in a differentiated way, depending on developmental aims. The comparative analysis of the results made it possible to clarify that different types of play activity influenced preschool children's cognitive activity unevenly and through different mechanisms of activity organisation. Didactic games proved most effective in developing regulatory components, as the clear structure of tasks, defined rules and the need to achieve a specific result supported concentration and the gradual growth of independence. Under these conditions, cognitive action became more consistent: children were less likely to lose the logic of task performance, maintained attention for longer and more often completed tasks without external support. This showed that the structured nature of the activity created conditions for a shift from situational participation to a more organised form of cognitive behaviour.

Role-play games demonstrated a different direction of influence. Their effectiveness was linked not so much to the organisation of activity as to the expansion of the communicative and initiative-related components of cognition. An open play situation, the need to reach an agreement and the joint development of the plot created conditions in which the child asked questions more often, suggested possible actions and independently sustained the development of interaction. As a result, cognitive activity acquired a more socialised character, since its maintenance depended on the ability to take account of other participants' positions, agree on roles and adjust one's own actions in response to changes in the game. Physical and free-play activities had a more moderate effect on the structural components of cognitive activity. Their effect was mainly related to maintaining emotional involvement, readiness to participate and a positive attitude towards shared activity. The increase in interest and general activity was not accompanied by such pronounced changes in independence, concentration or initiative as in the other two groups. This made it possible to suggest that insufficient structure and the absence of a need to sustain a cognitive task over time limited their influence on the more complex components of cognitive activity.

The summary of the results showed that the effectiveness of play was determined not by the mere fact of its use, but by the relationship between the nature of the play situation and the components of cognitive activity that it

activated. Didactic games proved more suitable for developing the organisation of cognitive action, role-play games for forming initiative and interaction, while physical and free-play activities mainly supported the emotional and motivational basis of activity. This distinction made it possible to specify the functional orientation of different types of play and to clarify the conditions for their pedagogical use in preschool education. The set of identified patterns provided a basis for further comparison of the findings with contemporary studies on the organisation of play activity and the development of cognitive activity in preschool children.

DISCUSSION

The findings showed that the effectiveness of play activity was determined not by its use as such, but by the way it was organised, its degree of structure and the nature of children's interaction. The study found that didactic games had the clearest effect on concentration and independence, roleplay games on initiative and questioning activity, whereas physical/free-play activities mainly supported general involvement without a substantial transition to stable cognitive activity. The influence of physically active forms on preschool children was examined in the study by M.A. AlWalah *et al.* (2024). The researchers established the acceptability of a multicomponent physical activity programme for preschool staff and parents, and identified factors that facilitated or hindered its implementation: clear materials, alignment with the institution's programme, and time and space constraints. In the present study, a similar finding was that physical/free-play activities also supported children's general involvement. The difference was that the authors focused mainly on the acceptability and organisational feasibility of physical activity, whereas the present study clarified its cognitive effect. It showed that physical games did not produce the same increase in the high level of cognitive activity as didactic or role-play games. This made it possible to specify the limits of their influence: they supported emotional and behavioural involvement, but had a weaker effect on independence, questioning activity and concentration.

Another aspect of the organisation of play-based learning was presented in the study by Y. Zhao *et al.* (2023), which proposed a model for improving games and analysing educational data in the training of preschool education specialists using deep learning. Their findings confirmed the importance of analytical modelling for improving the quality of play-based educational solutions. This corresponds with the findings of the present study through the idea that play forms should not be used arbitrarily, but require a carefully planned structure. At the same time, the difference was substantial: in authors' study, effectiveness was understood through technological optimisation and data analysis, whereas in the present study, it was examined through a pedagogically controlled protocol and direct observation of children. The findings complemented their approach by showing that, even without complex

digital models, the effectiveness of play depended substantially on the clarity of rules, the repeatability of the procedure, the stability of materials and the consistency of the type of play activity.

In the conclusions of A.I. Zourmpakis *et al.* (2022), considerable importance was attached to preparing educators to use play-based environments. Their study emphasised the ability of practising and future teachers to design and integrate adaptive gamified environments into science education. This helped explain one of the findings of the present study: the use of a single methodological protocol and preliminary instruction for educators reduced the variability of pedagogical influence. A shared idea was that play requires professional organisation, not merely the presence of game elements. However, the present study shifted the focus from digital adaptive gamification to traditional forms of preschool play: didactic, role-play and physical/free-play activities. This made it possible to clarify that effectiveness depended not only on the adaptability of the environment, but also on the correspondence between the type of play and the specific component of cognitive activity. Didactic games provided stronger support for regulatory components, whereas role-play games better supported communicative and initiative-related components.

The social dimension of play activity was examined in the study by A. Chatzipanteli & M. Adamakis (2022), in which structured play activities were considered as a means of developing children's communication, interpersonal skills and social interaction. The authors' conclusions were consistent with the results of the role-play group, where an increase in questioning activity and initiative was recorded. However, the present study specified that social interaction influenced not only communicative skills but also cognitive activity. Children's questions began to perform not an auxiliary function, but the function of coordinating and developing the plot. The difference also lay in the fact that the authors focused mainly on structured social play, whereas the present study compared three types of play activity. This made it possible to establish that role-play, specifically, rather than interaction of any kind, provided the strongest support for the initiative-based development of a shared cognitive situation.

The importance of didactic games for preschool children's learning was confirmed in the study by M. Muşaşcu (2021), where a survey of educators led to the conclusion that didactic and educational games have a real influence on learning. In the present study, this conclusion was empirically detailed through specific components of cognitive activity. The similarity lay in the confirmation of the pedagogical effectiveness of didactic games. The difference concerned the level at which the result was explained: author emphasised the general learning effect, whereas the present study found that the greatest changes concerned concentration and independence. This clarified the mechanism of influence: didactic games operated through the sequence of "condition – action – result", reduced randomness in behaviour and supported task completion. The

obtained data, therefore, extended previous findings by showing not only the fact of a positive influence, but also which components of cognitive activity changed most noticeably.

The issue of developing cognitive interest through play was central to the study by O. Rui (2024). That study identified organisational and educational conditions that supported the development of cognitive interests in older preschool children. The findings of the present study confirmed the importance of interest as the initial condition for involvement: at the ascertaining stage, it was the most clearly expressed component. At the same time, an important clarification was identified: a high level of interest did not guarantee an increase in independence or initiative. The comparison, therefore, showed that the conclusions of O. Rui (2024) required supplementation through component-based analysis. The present study showed that interest functioned as a starting mechanism, but its pedagogical value depended on whether it developed into questioning, independent choice of action and task completion. For this reason, didactic and role-play games proved more effective than physical/free-play activities: they created conditions for transforming interest into more stable cognitive behaviour. The development of children's independence was the subject of the study by I. Maimunah *et al.* (2025), which substantiated the effectiveness of a holistic approach integrating physical, social, emotional, cognitive and moral independence. This conclusion partly coincided with the findings of the present study, in which independence also emerged as a key indicator of the transition from externally supported participation to the child's own activity. The difference was that authors interpreted independence more broadly as a complex quality of early development, whereas the present study focused on its cognitive and regulatory dimensions. The greatest increase in independence was recorded in the didactic games group, where rules and an expected outcome helped the child act without constant adult prompting. This supplemented the authors' idea by showing that independence requires not only a general developmental environment, but also the specific organisation of a task in which the child can see the method of action and the criterion for completion.

Questioning activity as a tool of thinking was examined in depth in the study by A.K. Salmon & M.X. Barreira (2021). The researchers showed that the quality of educators' questions can either support or limit children's curiosity, thinking and learning. The findings of the present study intersect with this position by recognising questions as an important mechanism of cognitive activity. However, the difference lay in the source of the questions: authors focused mainly on pedagogical questioning, whereas the present study traced the questions asked by the children themselves. The most noticeable increase was recorded in the role-play group, where the need to clarify conditions, agree on roles and develop the plot stimulated independent questioning activity. This made it possible to extend previous findings: questions supported thinking not only when asked by the educator, but also when they arose from

the need to organise shared play. The approach of A. Ruggeri *et al.* (2021) helped to interpret the qualitative changes in questioning activity more precisely. Their study showed that children aged 4-6 years can ask more informative questions when appropriate cognitive support is provided, particularly through categorisation. A similar point in the present study was that children's questions were not treated as random verbal responses, but were linked to the organisation of cognition. The difference lay in the context: in authors' study, questioning developed within a specific task, whereas in the present study, it developed within role-play interaction. The findings showed that the informativeness and functionality of questions can be supported not only through classification tasks, but also through an imaginary situation in which the child has to determine how to act together with others. This clarified the social mechanism underlying the development of questioning behaviour in preschool age.

The review of studies on preschool children's attention and concentration by D.M. Calonge De la Piedra & O. López Regalado (2025) demonstrated growing scholarly interest in these processes and the need to systematise the factors that support them. The findings of the present study gave this general trend specific pedagogical content. Concentration was found to increase most clearly in the didactic games group, that is, where the task had a clear aim, a sequence of actions and a verifiable result. A shared point was the importance of attention as a basic condition of readiness for learning. At the same time, the difference was that the systematic review by authors outlined the field of research, but did not compare types of play across different pedagogical conditions. The present study supplemented the review-based approach with an empirical clarification: preschool children's attention was not strengthened equally in any kind of activity, but increased most in conditions of didactically structured play. In the study by X. Zhiyong (2025), role-play was examined as a form of activity in which the child takes on a particular role, acts in accordance with it and reproduces social situations through conditional interaction. This approach was particularly relevant to the present study, as the findings also showed that role-play games influenced not only children's general involvement, but above all their initiative and questioning activity. At the same time, author's position was specified empirically in the present study: role-play was considered not merely as a psychological phenomenon, but as a pedagogically organised environment for developing preschool children's cognitive activity. The increase in the proportion of children with a high level of initiative and questioning activity showed that taking on a role, coordinating actions with other participants and independently developing the plot created conditions for more active cognitive dialogue. The findings, therefore, confirmed the importance of role-play for socially mediated cognition, while also clarifying that its developmental effect depended on meaningful interaction between children and on their ability to influence the course of the play situation independently. Overall,

comparison with previous studies showed that the findings of the present study did not contradict existing conclusions about the importance of play, physical activity, questions, pedagogical organisation and independence in preschool development. At the same time, they refined these conclusions through a component-based logic: different types of play were found to influence different components of cognitive activity. Didactic games were most effective in organising action, role-play games activated questioning and initiative, while physical/free-play activities supported general involvement without a marked transition to stable cognitive behaviour. This made it possible to regard play activity not as a universal pedagogical tool, but as a differentiated system of influences.

CONCLUSIONS

The study established that preschool children's cognitive activity in play has an integrated character and includes interest, initiative, questioning activity, concentration and independence, which are interdependent. At the ascertaining stage, interest was found to predominate, with a high level recorded in 57.8% of children. This ensured children's involvement in the activity, but was not accompanied by a corresponding level of independence, with a high level recorded in 18.9%, or initiative, with a high level recorded in 23.3%. This indicated the uneven structure of cognitive activity, in which the motivational component was ahead of the regulatory and activity-based components. The influence of didactic games was reflected in changes in the cognitive components related to the organisation of activity. An increase was recorded in concentration, with the high level rising to 56.7%, and in independence, which rose to 43.3%. This indicated a stronger ability among children to maintain focus on a task, act consistently and complete an action without constant adult support. At the same time, the reduction in the low-level group to 10.0% confirmed a decrease in unstable forms of cognitive behaviour. The role of role-play games lies in the formation of initiative and cognitive interaction. An increase was found in questioning activity, with the high level rising to 53.3%, and in initiative, which rose to 50.0%. This reflected a shift from reactive participation to the independent development of activity. The changes were accompanied by the emergence of more complex forms of interaction: independent distribution of roles, coordination of actions and collective planning, which were recorded in approximately 40.0% of children by the end of the formative stage. The comparative analysis of the effectiveness of different types of play activity showed their differentiated outcomes. The most pronounced increase in the high level of cognitive activity was observed in the didactic games group (46.7%) and the role-play games group (43.3%), whereas in the physical/free-play group, this figure was 30.0%. At the same time, the proportion of children at the low level remained highest in the physical play group (23.3%), indicating the limited influence of these forms on the development of stable cognitive activity.

The summary of the results made it possible to establish that didactic games ensured the organisation of cognitive activity through a clear task structure, role-play games supported the development of initiative and interaction through the openness of the play situation, while physical and free-play activities mainly maintained general involvement without a substantial influence on its structural components. Taken together, the data confirmed the appropriateness of using different types of play activity in a differentiated way, depending on the aims of developing preschool children's cognitive activity. Further research should expand the sample to include different age groups, extend the duration of

the experiment in order to record long-term outcomes, and examine the combined use of different types of play activity as an integrated system for developing cognitive activity.

None.

None.

None.

ACKNOWLEDGEMENTS

FUNDING

CONFLICT OF INTEREST

REFERENCES

- [1] Al-Walah, M.A., Alotaibi, S.S., Alhusaini, A.A., Alotiabi, M.M., Donnelly, M., & Heron, N. (2024). Assessing the acceptability of a preschool-based multi-component physical activity intervention entitled "I'm an Active Hero" (IAAH): Process evaluation of a feasibility trial. *Healthcare*, 12(14), article number 1398. doi: [10.3390/healthcare12141398](https://doi.org/10.3390/healthcare12141398).
- [2] Bakhmat, N., Zahorodnia, L., Brushnevska, I., Ribtsun, Y., & Valentieva, T. (2025). Mobile game technologies and cognitive development in Ukrainian preschool and primary education: A correlational study. *International Journal of Interactive Mobile Technologies (ijim)*, 19(15), 147-164. doi: [10.3991/ijim.v19i15.55911](https://doi.org/10.3991/ijim.v19i15.55911).
- [3] British Educational Research Association. (2024). *Ethical guidelines for educational research (5th ed.)*. London: BERA.
- [4] Budnyk, O., Fomin, K., Romanyshyn, R., Lytvyn, I., Bondar, V., Nikolaesku, I., & Palkush, V. (2025). Educational innovation: Synergy of art therapy and play-based learning in preschool and primary school age. *Revista Brasileira de Educação do Campo*, 10, article number e20058. doi: [10.70860/ufmt.rbec.e20058](https://doi.org/10.70860/ufmt.rbec.e20058).
- [5] Calonge De la Piedra, D.M., & López Regalado, O. (2025). Systematic review of attention and concentration in preschool children: A look at the present. *Revista Tribunal*, 5(10), 637-652. doi: [10.59659/revistatribunal.v5i10.132](https://doi.org/10.59659/revistatribunal.v5i10.132).
- [6] Chatzipanteli, A., & Adamakis, M. (2022). Social interaction through structured play activities and games in early childhood. In *Handbook of research on using motor games in teaching and learning strategy* (pp. 80-99). Hershey: IGI Global Scientific Publishing. doi: [10.4018/978-1-7998-9621-0.ch005](https://doi.org/10.4018/978-1-7998-9621-0.ch005).
- [7] Chen, Y., & Ding, Z. (2024). Effects of digitalization in preschool education on the creative and cognitive development of children. *Education and Information Technologies*, 29(16), 21567-21591. doi: [10.1007/s10639-024-12730-y](https://doi.org/10.1007/s10639-024-12730-y).
- [8] Clemente-Suárez, V.J., Beltrán-Velasco, A.I., Herrero-Roldán, S., Rodríguez-Besteiro, S., Martínez-Guardado, I., Martín-Rodríguez, A., & Tornero-Aguilera, J.F. (2024). Digital device usage and childhood cognitive development: Exploring effects on cognitive abilities. *Children*, 11(11), article number 1299. doi: [10.3390/children11111299](https://doi.org/10.3390/children11111299).
- [9] da Silva, A.R. (2025). The learning process of preschool children. *Cognitus Interdisciplinary Journal*, 2(1), 263-282. doi: [10.71248/jwakqp31](https://doi.org/10.71248/jwakqp31).
- [10] Delfin, A.B., & Wang, W. (2023). The influence of pretend 'technologies' on children's cognitive development in symbolic play. *International Journal of Play*, 12(3), 387-402. doi: [10.1080/21594937.2023.2235474](https://doi.org/10.1080/21594937.2023.2235474).
- [11] Koval, T., Oliinyk, N., Kryvosheya, T., & Khilya, A. (2024). Application of gamification in higher education: Training of early childhood and primary education teachers in Ukraine. In *Environment. Technology. Resources. Proceedings of the international scientific and practical conference* (pp. 183-187). Riga: Riga Technical University. doi: [10.17770/etr2024vol2.8051](https://doi.org/10.17770/etr2024vol2.8051).
- [12] Law of Ukraine No. 2297-VI "On Personal Data Protection". (2010, June). Retrieved from <https://zakon.rada.gov.ua/go/2297-17>.
- [13] Law of Ukraine No. 2402-III "On Child Protection". (2001, April). Retrieved from <https://zakon.rada.gov.ua/go/2402-14>.
- [14] Lohvytska, L., Martovytska, N., Kolomiets, O., & Sheleg, T. (2025). E-learning in developing interaction with the environment as soft skills in 6-year-old children (on the example of preschool educational institutions in Ukraine and France). In *E-learning and enhancing soft skills: Contemporary models of education in the era of artificial intelligence* (pp. 157-176). Cham: Springer Nature Switzerland. doi: [10.1007/978-3-031-82243-8_9](https://doi.org/10.1007/978-3-031-82243-8_9).
- [15] Maimunah, I., Mundiri, A., Abimbowo, Y.O., & Lama, A.V. (2025). Sustaining quality early childhood education through increasing student independence. *Early Childhood Development Gazette*, 2(1), 26-37. doi: [10.61987/gazette.v2i1.764](https://doi.org/10.61987/gazette.v2i1.764).
- [16] Maria, I., Yufiarti, Y., & Sumantri, S. (2025). The impact of interactive game-based media on enhancing positive discipline in preschool children. *Journal of Neonatal Surgery*, 14(2), 121-135. doi: [10.52783/jns.v14.1790](https://doi.org/10.52783/jns.v14.1790).
- [17] Marievych, N., Nesterovych, B., Turchyn, T., Kryvosheya, T., Shyshova, O., & Nadon, V. (2022). Management of the play activity of primary schoolchildren: A critical look at Ukrainian trends from the point of view of international experience. *Revista Românească pentru Educație Multidimensională*, 14(1), 328-348. doi: [10.18662/rrem/14.1Sup1/554](https://doi.org/10.18662/rrem/14.1Sup1/554).

- [18] Municipal Institution "Preschool Education Institution No. 11 of Vinnytsia City Council". (n.d.). *Information about the institution*. Retrieved from <https://krainamriy.vn.ua/informatsiya-pro-zaklad>.
- [19] Mutaşcu, M. (2021). [The impact of the didactic game in preschool education](#). *Journal of Romanian Literary Studies*, 27, 591-600.
- [20] Nehrii, O., Kruty, K., Desnova, I., Zdanevych, L., & Kovalchuk, I. (2025). Models of pedagogical support for early and preschool-aged children affected by emergencies: Global perspectives and adaptation for Ukraine. *Journal of Curriculum and Teaching*, 14(1), 283-301. doi: 10.5430/jct.v14n1p283.
- [21] Order of Ministry of Education and Science of Ukraine No. 552 "On Approval of the Regulation on the Procedure for Implementing Innovative Activities in the Field of Education". (2023, May). Retrieved from <https://zakon.rada.gov.ua/go/z1155-23>.
- [22] Ponomarenko, T., & Kuzina, O. (2023). Formation of cognitive activity in children of older preschool age. In A. Jankovska (Ed.), *The scientific paradigm in the context of technological development and social change* (pp. 371-404). Riga: Baltija Publishing. doi: 10.30525/978-9934-26-297-5-35.
- [23] Ponomarenko, T., & Kuzina, O. (2025). Development of teachers' ability to form cognitive activity of senior preschoolers in a preschool education institution. In *Innovations in science: Current research and advanced technologies: Scientific monograph* (pp. 601-629). Riga: Baltija Publishing. doi: 10.30525/978-9934-26-531-0.
- [24] Preschool Education Institution (Nursery-Kindergarten) No. 113 of Darnytskyi District of Kyiv. (n.d.). Retrieved from <https://dnz113.kyiv.ua/>.
- [25] Preschool Educational Institution Nursery-Kindergarten of Combined Type No. 12 of Uman. (n.d.). Retrieved from <https://www.dnz12.com.ua/>.
- [26] Ruggeri, A., Walker, C.M., Lombrozo, T., & Gopnik, A. (2021). How to help young children ask better questions? *Frontiers in Psychology*, 11, article number 586819. doi: 10.3389/fpsyg.2020.586819.
- [27] Rui, O. (2024). Formation of cognitive interests in children of older preschool age in the conditions of game activities. *Scientific Journals of the International Academy of Applied Sciences in Lomza*, 93(1), 186-196. doi: 10.58246/k9e7zt13.
- [28] Salmon, A.K., & Barrera, M.X. (2021). Intentional questioning to promote thinking and learning. *Thinking Skills and Creativity*, 40, article number 100822. doi: 10.1016/j.tsc.2021.100822.
- [29] Shaheen, G., Ullah, N., & Zafar, J.M. (2024). Effect of teachers' instruction on learners' cognitive skills, attention, perception and memory in early childhood education. *Journal of Development and Social Sciences*, 5(2), 478-489. doi: 10.47205/jdss.2024(5-II-S)46.
- [30] UNICEF. (2021). *UNICEF procedure on ethical standards in research, evaluation, data collection and analysis*. Retrieved from <https://www.unicef.org/evaluation/media/1786/file/UNICEF%20Procedure%20on%20Ethical%20Standards%20in%20Research%2C%20Evaluation%2C%20Data%20Collection%20and%20Analysis.pdf>.
- [31] United Nations. (1989). *Convention on the rights of the child*. Retrieved from <https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child>.
- [32] Vahlo, J., Tuuri, K., & Välisalo, T. (2022). Exploring gameful motivation of autonomous learners. *Frontiers in Psychology*, 13, article number 825840. doi: 10.3389/fpsyg.2022.825840.
- [33] Vatamaniuk, H., Hazina, I., Dutkevych, T., Panchuk, N., Lebid, I., & Dutko, O. (2024). The role of interactive methods in preparing preschool children for studying at the new Ukrainian school. *International Electronic Journal of Elementary Education*, 17(1), 103-114. doi: 10.26822/iejee.2024.366.
- [34] Vseosvita. (2021). *Didactic game "find the odd object"*. Retrieved from <https://vseosvita.ua/library/didakticna-gra-znajdi-zajvij-predmet-497239.html>.
- [35] Vseosvita. (2024a). *Didactic game "what has changed?"*. Retrieved from <https://vseosvita.ua/library/dydaktychna-hra-shcho-zminylosia-842201.html>.
- [36] Vseosvita. (2024b). *Didactic game "continue the sequence"*. Retrieved from <https://vseosvita.ua/library/dydaktychna-hra-prodovzhy-riad-882472.html>.
- [37] Zhao, Y., Gao, W., & Ku, S. (2023). Optimization of the game improvement and data analysis model for the early childhood education major via deep learning. *Scientific Reports*, 13(1), article number 20273. doi: 10.1038/s41598-023-46060-9.
- [38] Zhiyong, X. (2025). Role play. In *The ECPH encyclopedia of psychology* (pp. 1298-1299). Singapore: Springer Nature Singapore. doi: 10.1007/978-981-97-7874-4_817.
- [39] Zourmpakis, A.I., Papadakis, S., & Kalogiannakis, M. (2022). Education of preschool and elementary teachers on the use of adaptive gamification in science education. *International Journal of Technology Enhanced Learning*, 14(1), 1-16. doi: 10.1504/IJTEL.2022.120556.

Інна Мисан

Кандидат педагогічних наук, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0001-9416-4484>

Світлана Дем'яненко

Кандидат педагогічних наук, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0002-0161-7024>

Ігрова діяльність як засіб розвитку пізнавальної активності дітей дошкільного віку

Анотація. Метою дослідження було встановлення порівняльної ефективності різних видів ігрової діяльності у розвитку пізнавальної активності дітей дошкільного віку. Дослідження здійснювалося як квазіекспериментальне емпіричне вивчення із використанням педагогічного спостереження, формувального експерименту та порівняльного аналізу. Вибірку становили 90 дітей віком 5-6 років, розподілених на три групи відповідно до типу ігрової діяльності за єдиним методичним протоколом. Установлено, що пізнавальна активність має інтегровану структуру з домінуванням інтересу (57,8 %) за недостатньої вираженості самостійності (18,9 %) та ініціативності (23,3 %) на початковому етапі. У групі дидактичних ігор зафіксовано зростання зосередженості (до 56,7 %) і самостійності (до 43,3 %), що відобразило посилення здатності дітей утримувати завдання та завершувати дію без зовнішньої підтримки. У сюжетно-рольових іграх відзначено підвищення питальної активності (до 53,3 %) та ініціативності (до 50,0 %), що супроводжувалося переходом до самостійного розгортання ігрової взаємодії. У групі рухливих ігор зміни мали обмежений характер і стосувалися переважно загальної залученості без суттєвого впливу на структурні компоненти пізнавальної активності. Порівняльний аналіз показав вищу частку дітей із високим рівнем у дидактичній (46,7 %) і сюжетно-рольовій (43,3 %) групах порівняно з рухливою (30,0 %). Практична значущість дослідження полягає в можливості використання отриманих результатів для добору ігрових форм у закладах дошкільної освіти: дидактичних ігор – для розвитку зосередженості й самостійності, сюжетно-рольових – для посилення ініціативності та питальної активності, рухливих і вільних – для підтримання загальної залученості дітей

Ключові слова: інтерес; ініціативність; зосередженість; самостійність; взаємодія; динаміка; організація

Vasyl Dudar*

PhD in Historical Sciences, Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlyns'koho Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0001-6064-9408>

Education as a factor in shaping the social responsibility of youth in the context of contemporary societal transformations

Abstract. The aim of the study was to identify the pedagogical mechanisms for developing students' civic engagement and to analyse the role of higher education as an institutional factor in the formation of a socially responsible individual during a period of dynamic changes in the social order. The study employed a systemic approach, structural-functional analysis, the comparative method, regulatory-legal analysis, and content analysis of scholarly sources and strategic documents from foreign countries. The findings of the study established that youth social responsibility is a three-component quality combining cognitive, emotional-motivational, and behavioural dimensions, with the development of only one failing to ensure the formation of stable responsible behaviour. Six structural elements of the university environment were identified that differentially influence the development of students' civic stance, namely the content of curricula, active learning methods, extracurricular activities, student self-governance, volunteering, and the institutional culture of the establishment. It was determined that civic education in Ukraine is fragmented compared to the systematised approaches of Great Britain, Germany, Finland, the USA, and Zambia, where the corresponding preparation is implemented as a distinct compulsory course with clearly defined competencies. It was ascertained that digital responsibility constitutes an independent, new dimension of youth social responsibility requiring targeted pedagogical elaboration. A set of proposals for enhancing the effectiveness of civic consciousness formation within the higher education system at its various organisational levels was developed. The core pedagogical conditions for fostering social responsibility were identified as the integration of a cross-cutting value-oriented environment, the incorporation of reflective practices, and compulsory real-world community practice. The practical significance of the obtained results lies in the possibility of their application in devising university strategies for educational work, updating curricula content, and shaping state educational policy towards the systemic cultivation of citizenship.

Keywords: prosocial behaviour; moral consciousness; youth centres; digital activism; reflective practices; psychological-pedagogical factors

INTRODUCTION

The deepening of democratic processes, the digitalisation of the public sphere, and the re-evaluation of value orientations in post-conflict societies are shaping a new context in which education is regarded as a structural factor in the civic and moral formation of the individual. In parallel, there is a growing demand from the state and civil society for young people capable of actively participating in public life, responding to collective challenges, and being aware of the consequences of their own decisions for the

community. These processes foreground the need for a systematic study of the ways in which educational institutions can effectively cultivate young people's readiness for responsible social behaviour. Despite the declared priority of educating the responsible citizen in official educational documents, the specific pedagogical mechanisms for its implementation within school and university environments remain insufficiently developed and are a matter of debate. Dynamic changes in the information space,

Suggested Citation:

Dudar, V. (2026). Education as a factor in shaping the social responsibility of youth in the context of contemporary societal transformations. *Scientia et Societatis*, 5(1), 86-101. doi: 10.69587/ss/1.2026.86.

*Corresponding author (dudarvasyl2013@gmail.com)



the expanding presence of youth on social media, and the transformation of traditional institutions of socialisation further complicate the practical resolution of this task and necessitate an updating of approaches to educational work with youth.

The issue of shaping youth social responsibility in the educational context has been reflected in a number of foreign and domestic studies. Researchers R. Vynola *et al.* (2025) established that social upbringing played a decisive role in the formation of civic consciousness in Ukraine. The work revealed that purposeful educational work in educational institutions contributed to the formation of stable socially oriented attitudes among students. Authors I. Moroz & V. Kayun (2025) focused on the significance of historical education in the process of forming young people's civic identity. The study demonstrated that studying national and world history positively correlated with the level of civic engagement among pupils and students. In turn, researcher R. Singh (2025) studied the interrelationship between cultural shifts in the youth environment and the transformation of notions of social duties. The work documented that the change in cultural reference points directly affected how youth defined the boundaries of their responsibility to society. Researcher O. Svysiuk (2026) assessed the social role of the religious factor in contemporary Ukraine within the context of societal transformations. This study revealed that institutional forms of spiritual upbringing partially compensated for the gaps in the formation of youth value culture that arose as a result of the reformation of the education system. The team of authors G. Byun *et al.* (2026) studied the approaches of public libraries to working with teenagers and also the perception of the educational and simultaneously cultural space in Korean libraries. The study found that specially organised teen zones in libraries were perceived by youth as a space for independent activity and social interaction with peers. This finding is relevant in the context of forming social responsibility, where non-formal institutions are capable of providing conditions for the development of autonomy, initiative, and social engagement among youth – qualities that are components of responsible civic behaviour. Researchers S. Wahda *et al.* (2026) investigated the influence of social media on changes in the behaviour and moral reference points of adolescents from the perspective of Islamic education. The obtained data indicated that the digital environment generated specific risks for the moral formation of youth, the overcoming of which required targeted educational interventions. Author P.L. Jamatia (2023) focused on the role of youth in counteracting social inequality and on the possibilities of their engagement in solving societal problems; the study summarised data indicating that it was precisely the educational resource that proved decisive in forming young people's capacity for social action.

Despite the significant body of published works, a number of gaps are noted in the scholarly field that limit the comprehensiveness of understanding the problem under study. The majority of studies have treated education

as a homogeneous influencing factor, without differentiating the functional distinctions between general school education, higher education, and non-formal educational practices. The question of precisely which structural characteristics of the educational environment exert a decisive influence on the formation of social responsibility remains without a definitive answer. The process of transforming the value attitudes of youth in conditions of societal crises and conflicts, particularly in the Ukrainian context, also remains insufficiently studied. Furthermore, the connection between declared educational outcomes and real models of young people's social behaviour in the extracurricular environment remains outside the attention of researchers.

The aim of the study was to identify the pedagogical mechanisms for developing students' civic stance and to analyse the role of higher education as an institutional factor in the formation of a socially responsible individual during a period of dynamic changes in the social order. To achieve the aim, three objectives were pursued. The first objective was to conceptually clarify the content and structure of the concept of "youth social responsibility" and to identify the structural elements of the university environment that influence the formation of students' civic stance. The second objective involved conducting a comparative analysis of the civic education systems of Ukraine, the USA, Great Britain, Germany, Finland, and Zambia. The third objective was aimed at determining the key pedagogical conditions for effective educational influence and developing a three-tier structural model with practical recommendations for higher education in Ukraine.

MATERIALS AND METHODS

The study was devoted to examining the role of education as a factor in shaping the social responsibility of youth under the conditions of contemporary societal transformations. The study is theoretical in nature, which entails certain limitations associated with the necessity of further empirical verification of the findings obtained in future inquiries. The source base of the study comprises scholarly articles published since 2021 and selected from the scientometric databases Scopus, Web of Science, and Google Scholar. The key criteria for source selection were thematic relevance, chronological currency, and the scientific standing of the publications, as well as linguistic coverage, which included Ukrainian- and English-language works as the primary sources, with the inclusion of select sources in other languages. The works of P. McGorry *et al.* (2024), J. Tabrizi *et al.* (2024), and M. Lin *et al.* (2023) were used for the interdisciplinary substantiation of the neurobiological and socio-cognitive aspects of youth development.

The scientific inquiry process was implemented in five consecutive stages. At the first stage, a content analysis of scholarly sources was conducted, notably the works of J. Abbas (2025), L. Kolomiiets *et al.* (2021), D. Hellison *et al.* (2025), N. Garan (2026), R. Vynola *et al.* (2025), T.D. Fedirchuk & D.R. Tymchuk (2025), W.C.H. Hong *et al.* (2023),

A. Szymkowiak *et al.* (2021), and S. Marginson (2024), based on the results of which the structure of youth social responsibility was clarified as a multi-component phenomenon. Coding was carried out in two steps: initially, textual fragments relevant to the research subject were identified, after which each fragment was assigned to one of five pre-defined categories based on the semantic proximity of the terminology used. The coding categories were: social responsibility, with the subcategories of cognitive, emotional-motivational, and behavioural dimensions; civic stance; educational environment, with the subcategories of formal education, non-formal education, student self-governance, and volunteering; digital responsibility; and pedagogical mechanism. Civic engagement, digital responsibility, volunteering, student self-governance, and civic education were examined as constituents of youth social responsibility in its institutional dimension.

The second stage involved a regulatory and legal analysis of four documents. Articles 6, 7, 9, and 12 of the Law of Ukraine No. 2145-VIII (2017) were analysed concerning the educative function and civic competence as a priority of educational activity; Articles 32, 33, and 40 of the Law of Ukraine No. 1556-VII (2014) regarding institutional autonomy and the legal foundations of student self-governance as a mechanism of democratic practice; the sections on youth engagement and volunteering of the Decree No. 487/2021 (2021); and the principles of integrating civic education into educational programmes, as enshrined in the Order of Cabinet of Ministers of Ukraine No. 710-r (2018). The indicated documents constitute the normative framework within which the university is obliged to implement the educative function and ensure the conditions for shaping students' social responsibility.

At the third stage, a comparative analysis of the civic education systems of six countries was carried out: Ukraine, the USA, the United Kingdom, Germany, Finland, and Zambia. The choice of countries was substantiated by the necessity to encompass different educational models: the Anglo-Saxon model (USA, United Kingdom), the continental model (Germany), the Scandinavian model (Finland), the model of a transforming country (Zambia), and the national model (Ukraine) as the object of study. The analysis was operationalised according to three criteria: the presence of a separate compulsory civic education course; the level of normative enshrinement and the specificity of defined competencies – an integrated criterion combining two interrelated aspects: whether civic education is enshrined in official educational documents and how concretely the competencies, expected learning outcomes, knowledge, and skills are defined therein; and the degree of integration of digital responsibility, assessed by the presence of modules on media literacy, digital ethics, and cybersecurity in curricula. To ensure the comparability of the results, each criterion was assessed using a three-level scale: basic level – the respective component is present fragmentarily or enshrined only declaratively; intermediate level – the component is present in official

documents or programmes, yet not systemically integrated; advanced level – the component is normatively enshrined, has defined competencies, and is consistently incorporated into the educational process. The source base for the comparison consisted of the official normative documents of each country: for the USA, the standards of the NCSS (2023), which is the leading professional association in the field of social studies education; for the United Kingdom, the National Curriculum programme of the Department for Education (2024); for Germany, the recommendations of the KMK (2022) as the inter-state coordinating body for educational policy; for Finland, the EDUFI (2024); for Ukraine, Order of Cabinet of Ministers of Ukraine No. 710-r (2018); for Zambia, the analytical work of C.C. Thelma (2024), which systematises approaches to civic upbringing in the context of national development. At the fourth stage, theoretical modelling was carried out based on the obtained data: a cyclical model for shaping social responsibility and a three-level structural model of pedagogical mechanisms were developed, encompassing the state, institutional, and pedagogical levels. At the fifth stage, analytical generalisation and pedagogical interpretation of the results were conducted, accompanied by the formulation of practical recommendations for the higher education system of Ukraine.

RESULTS

Theoretical foundations for understanding youth social responsibility in pedagogical discourse. Social responsibility as a scholarly domain resides at the intersection of pedagogy, sociology, psychology, and philosophy. Within pedagogical discourse, this concept is traditionally regarded as an integral quality of the individual, manifested in the ability to be aware of one's own actions, to anticipate their consequences for other people and society as a whole, and to act in accordance with accepted social norms. The formation of this quality in a young person constitutes one of the key tasks of contemporary education. The concept of social responsibility in pedagogical science has undergone a certain evolution. In the Soviet pedagogical tradition, it was predominantly reduced to the fulfilment of collective duties and subordination to the public interest. After 1991, pedagogy progressively rethought this concept in the context of democratic values, emphasising its individual-personal dimension, namely, a person's capacity to make decisions independently and to bear responsibility for them before society. Social responsibility of youth is understood as the observance of legal norms, active participation in public life, readiness for volunteering, support for democratic institutions, and adherence to moral and ethical principles. The comprehension of these norms shapes the cognitive component of social responsibility – the foundation without which conscious civic behaviour is impossible. Table 1 presents the results of the content analysis of scholarly sources across the five identified categories. Typical provisions (fragments) that served as the basis for coding are provided for each category.

Table 1. Results of content analysis of sources by research categories

Category	Subcategory/Dimension	Semantic Units (Coding Results)
Social Responsibility	Cognitive Dimension	Awareness of the consequences of one's own actions for other people and society; understanding of the connection between individual choice, social norms, and collective outcomes
	Emotional and Motivational Dimension	Internal readiness for prosocial action; development of empathy, a sense of belonging to the community, and the personal significance of solving problems
	Behavioural Dimension	Practical realisation of responsibility through volunteering, environmental initiatives, adherence to legal norms, and active assistance to one's surroundings
Civic Stance	-	A stable system of attitudes towards societal processes; the individual's identification with the national-cultural space and readiness for the legal protection of community interests
Educational environment	Formal Education	Acquisition of fundamental knowledge about human rights, democratic institutions, and mechanisms of public administration through academic disciplines
	Non-formal Education	Transformation of theoretical concepts into practical experience within the framework of youth centres, social hubs, and open educational platforms
	Student Self-governance	Acquisition of skills in delegation, collective decision-making, representation of interests, and experience of real accountability for work outcomes
	Volunteering	An integrative space where the understanding of social deficits, emotional response, and direct assistance are realised simultaneously
Digital Responsibility	-	Formation of critical thinking regarding online content; ethics of digital communication; awareness of the long-term consequences of one's digital footprint and counteraction to disinformation
Pedagogical Mechanism	-	A set of conditions (value-based environment, reflective practices) and tools (case studies, projects) that translate external requirements into the internal attitudes of the individual

Source: compiled by the author based on L. Kolomiiets *et al.* (2021), A. Szymkowiak *et al.* (2021), W. Hong *et al.* (2023), S. Marginson (2024), J. Abbas (2025), D. Hellison *et al.* (2025), T. Fedirchuk & D. Tymchuk (2025), R. Vynola *et al.* (2025), N. Garan (2026)

The results of the content analysis demonstrated that the social responsibility of youth is a multidimensional phenomenon, which in the analysed sources is described through three interdependent dimensions. The cognitive dimension is predominantly represented through the categories of awareness of the consequences of one's own actions and understanding of social norms. The emotional and motivational dimension is captured through the concepts of empathy, belonging, and internal readiness for prosocial action. The behavioural dimension is operationalised through specific practices, notably volunteering, civic participation, and adherence to legal norms. The category of the educational environment is represented in the sources by four subcategories reflecting different institutional forms of influence on the formation of responsibility: formal education, non-formal education, student self-governance, and volunteering. Digital responsibility has emerged as an independent category, which cannot be reduced to any of the three main dimensions and requires distinct pedagogical attention. The pedagogical mechanism is described in the sources as a set of conditions and tools ensuring the transition from externally imposed requirements to internally accepted value orientations. Overall, the analysis confirmed that none of the examined sources considers social responsibility as a unidimensional quality, which substantiates the necessity of a comprehensive pedagogical approach to its formation.

Civic-mindedness is a broader category encompassing an individual's legal, political, and cultural literacy, identification with a specific community, and readiness to participate in its life. Social responsibility is a component of civic-mindedness, yet it is specifically focused on the behavioural dimension – real actions (Garan, 2026). Moral consciousness, in turn, is an internal prerequisite for social responsibility, forming the value basis upon which responsible deeds are founded. A person with a developed moral consciousness is capable of feeling guilt, empathy, and a striving for justice, but this does not yet guarantee responsible behaviour. In conclusion, it is precisely for this reason that pedagogy considers social responsibility as a combination of internal motivation (moral consciousness) and external manifestation (prosocial behaviour). Prosocial behaviour denotes specific actions aimed at helping others, supporting the community, and participating in socially significant initiatives. It is the “visible” part of social responsibility and can be measured and researched empirically (Hellison *et al.*, 2025). Hence, moral consciousness nourishes the emotional and motivational component of social responsibility, whereas prosocial behaviour is its direct behavioural manifestation. The generalised Table 2 systematises the key concepts of pedagogical discourse in the field of youth social responsibility.

Table 2. Comparative characteristics of related concepts in pedagogical discourse

Concept	Definition	Dimension	Connection with Social Responsibility
Social Responsibility	The individual's conscious attitude towards their actions, taking into account their consequences for society	Value-based + Behavioural	Central category
Civic-mindedness	The individual's legal, political, and cultural identification with the community	Identificational + Activity-based	A broader concept that includes social responsibility

Table 2. Continued

Concept	Definition	Dimension	Connection with Social Responsibility
Moral Consciousness	The system of internal value orientations that regulates behaviour	Internal (Axiological)	A prerequisite for social responsibility
Prosocial Behaviour	Specific actions aimed at supporting others and society	Behavioural (External)	A manifestation of social responsibility in actions
Civic Stance	The individual's active attitude towards societal processes and readiness to influence them	Value-based + Activity-based	A component of social responsibility

Source: compiled by the author based on N. Garan (2026)

An analysis of the presented concepts indicates that social responsibility occupies a central place in the system of related pedagogical concepts. It is not identical to civic-mindedness (which is broader in scope), nor to prosocial behaviour (which is merely its external manifestation), nor to moral consciousness (which is an internal prerequisite). The combination of these components forms a fully socially responsible individual, the formation of whom is the goal of contemporary education. The age-specific characteristics of the formation of social responsibility constitute a necessary aspect of pedagogical analysis. Young people aged 17 to 25 are at a stage which, in psychological science, is conventionally termed late adolescence or early adulthood. This period is characterised by an active search for identity, the formation of one's own system of values, heightened sensitivity to social influences, and, simultaneously, a striving for autonomy. During this period, the individual is open to the internalisation of norms of social responsibility, but on the condition that the educational environment creates appropriate conditions for this (McGorry *et al.*, 2024).

The prefrontal cortex, which is responsible for planning, anticipating the consequences of actions, and moral judgement, reaches full maturity only around the age of 25, thus substantiating the age-related sensitivity of student youth to educational influences: a young person is physiologically in the process of developing the capacity for responsible behaviour, and therefore educational influences during this period are of particularly profound significance (McGorry *et al.*, 2024). Pedagogy takes this fact into account by devising specific approaches to fostering responsibility that are oriented precisely towards the student age group. The sociocultural context also substantially determines the content and forms of young people's social responsibility. Under conditions of societal transformation, particularly in Ukraine after 2022, the formation of young people's social responsibility occurs against the backdrop of martial law,

social tension, population displacement, and a re-evaluation of the role of civic participation. In crisis conditions, social responsibility can either be strengthened (through societal consolidation) or weakened (through psychological exhaustion, anxiety, and alienation). Therefore, pedagogical approaches to fostering social responsibility must take into account the current socio-psychological state of young people (Tabrizi *et al.*, 2024). The social stress of wartime primarily weakens the emotional-motivational component – the sense of belonging and the intrinsic impetus for action – rendering targeted pedagogical support particularly essential during this very period.

The digital environment constitutes another sociocultural factor that defines the contemporary scope of social responsibility formation. Young people spend a considerable portion of their social life in the online space, where new forms of both responsible and irresponsible behaviour are shaped, ranging from cyberbullying and disinformation to digital activism and online volunteering. The level of education correlates with the level of awareness regarding cybersecurity and responsible online behaviour; university students demonstrate a significantly higher level of critical thinking in relation to online content compared to young people not pursuing higher education (Hong *et al.*, 2023). The digital environment, therefore, generates a specific demand for the development of all three components of social responsibility: the cognitive (critical appraisal of information), the emotional-motivational (awareness of responsibility for one's own online behaviour), and the behavioural (concrete actions – digital activism, online volunteering, refusal to disseminate disinformation). This confirms the significance of education as an institutional mechanism for shaping responsible behaviour even in the new – digital – dimension of social life. Table 3, which reflects the structure of young people's social responsibility as a pedagogical category, is presented below.

Table 3. Age-related and sociocultural specificities of the formation of young people's social responsibility

Factor	Characteristic	Pedagogical significance
Age (17-25 years)	Late adolescence/early adulthood; active identity seeking	The most favourable period for the formation of value orientations
Neurobiological development	Maturation of the prefrontal cortex; formation of the capacity for moral judgement	Educational influence carries particular weight during this period
Social stress	War conflict, economic instability, displacement	Risk of responsibility weakening due to exhaustion; need for targeted pedagogical support
Digitalisation	A significant part of social life transferred online	Formation of digital responsibility as a new dimension of social responsibility

Table 3. Continued

Factor	Characteristic	Pedagogical significance
Cultural identity	Re-evaluation of national values under conditions of transformation	Civic education acquires heightened relevance

Source: compiled by the author based on W.C.H. Hong *et al.* (2023), P.D. McGorry *et al.* (2024), J.S. Tabrizi *et al.* (2024)

An analysis of the age-related and sociocultural specificities presented in the table demonstrates that the formation of social responsibility is a complex, multidimensional process simultaneously influenced by biological, psychological, and social factors. Pedagogy cannot focus exclusively on one of these, as an effective approach must consider the entire constellation of factors and construct educational strategies in accordance with the current context. The question of precisely which structural components constitute social responsibility as a personal quality merits separate attention. In pedagogical science, it is customary to distinguish at least three such components: the cognitive, the emotional-motivational, and the behavioural. The cognitive component encompasses knowledge of social norms, rights, and duties, and an understanding of the interdependence between individual actions and societal consequences. The emotional-motivational

component includes intrinsic motivation for responsible behaviour, empathy, and a sense of belonging to the community. The behavioural component refers to concrete actions that attest to genuine responsibility: participation in volunteering, socially significant initiatives, and a responsible attitude towards one's own environment (Hellison *et al.*, 2025). The development of one component does not guarantee the development of the others. A student may possess knowledge of social norms (cognitive component) and yet not feel an internal motivation for responsible behaviour. Or, conversely, they may act responsibly in specific situations without having a systemic understanding of social mechanisms; consequently, the pedagogical influence must be directed at all three components simultaneously, and not merely aimed at informing or upbringing. Figure 1, depicting the three components of social responsibility and their interrelationships, is presented below.



Figure 1. Structural components of young people's social responsibility and their characteristics

Source: compiled by the author based on L. Kolomiets *et al.* (2021), D. Hellison *et al.* (2025)

The analysis of the social responsibility components in Figure 1 demonstrated that none of them is self-sufficient. The cognitive component provides understanding, but without emotional engagement, it does not translate into motivation to act. Emotional engagement without knowledge and skills remains passive sympathy. The behavioural component is the final outcome, but it is only stable when underpinned by understanding and intrinsic motivation. Thus, the pedagogical process must ensure the development of all three components in their interaction. A separate aspect is the question of the factors that influence the formation of socially responsible behaviour in young people. In the field of health sciences and behavioural sciences, several groups of such factors are identified: individual (level of self-efficacy, value orientations, level of education), familial (parenting style, level of

parents' social engagement), institutional (quality of the educational environment, availability of extracurricular programmes), and macro-social (state social policy, cultural norms, media environment) (Tabrizi *et al.*, 2024). These factors do not operate in isolation but in complex interaction; therefore, pedagogical work on fostering responsibility is more effective when it takes the entire system of influences into account.

A special role among these factors is assigned to the institutional environment, in particular, to youth centres and other non-formal educational structures. Institutions exert an educational influence in a less formalised yet no less effective format, namely through engaging young people in real activities, horizontal communication with peers, and the development of leadership qualities and civic competence. Youth centres function as a space where

formal knowledge about responsibility is transformed into real practices (Garan, 2026). Non-formal institutions, in particular youth centres, purposefully influence primarily the behavioural and emotional-motivational components, providing what formal education often fails to achieve – a real experience of responsible action within a community. Volunteering is one of the researched practical mechanisms for fostering social responsibility. It combines all three components of responsibility: it engages the cognitive constituent (understanding of social problems), the emotional-motivational (compassion, a sense of personal significance), and the behavioural (real help).

Volunteering serves as an exemplar of how the interaction of all three components of social responsibility manifests in real-world practice. A student who possesses theoretical knowledge of social inequality or human rights (the cognitive component) does not necessarily proceed to action. This transition becomes possible only when emotional engagement emerges: direct contact with individuals in need of assistance fosters empathy and a sense of personal involvement (the emotional-motivational component). It is precisely this intrinsic motivation that prompts concrete actions, namely systematic participation in projects and decision-making under conditions of genuine accountability to others (the behavioural component). Volunteer experience, in turn, deepens the cognitive understanding of social issues, thereby forming a closed loop of mutual reinforcement among the components. Thus, volunteering is both a means of developing specific skills and a milieu in which social responsibility is cultivated as a holistic personal quality. A synthesis of the theoretical foundations provides grounds for asserting that youth social responsibility is a multidimensional quality whose formation requires a comprehensive pedagogical approach that takes into account age-related, neurobiological, sociocultural, and institutional factors. The pivotal question is which specific institutional mechanisms are capable of ensuring the holistic development of all three components – and it is this very question that defines the subject of the following subsection.

A higher education institution fulfils a dual role in shaping students' civic stance. On the one hand, it transmits societal experience through the formal constituents of its environment, notably curricula and teaching methods. On the other hand, it creates conditions for personal development through informal constituents, namely extracurricular activities, student self-governance, and the institution's own organisational culture (Marginson, 2024). The legislative foundation for this function is enshrined in Articles 6, 7, 9, and 12 of the Law of Ukraine No. 2145-VIII (2017) and Articles 32, 33, and 40 of the Law of Ukraine No. 1556-VII (2014). Curricular content forms the cognitive basis of civic stance; however, in itself, it does not guarantee the transition from knowledge to action. This transition becomes possible solely through active learning methods, specifically the analysis of real-life situations, discussions, and project-based work, which prompt a student to formulate and defend their own position (Fedirchuk & Tymchuk, 2025). Extracurricular activities complement this process by providing direct experience of civic participation. Behavioural models acquired through practice and peer observation are significantly more robust compared to those formed exclusively through verbal instruction (Lin *et al.*, 2023). Student self-governance functions as a micromodel of democratic institutions, within which a student gains authentic experience in decision-making, advocacy of interests, and consensus-building. The efficacy of this mechanism is determined by the actual scope of authority held by the student body within the university structure, rather than merely the fact of its formal existence (Fedirchuk & Tymchuk, 2025). Volunteering operates at a deeper personal level, since direct contact with social problems cultivates empathy in the student and a sense of personal belonging to society. Unlike academic disciplines, volunteering precludes distancing from reality and transforms the student into an active agent of public life. Table 4 below systematises the structural elements of the university educational environment and their respective contributions to the formation of students' civic stance.

Table 4. Structural elements of the university educational environment as factors in shaping students' civic stance

Element of the Educational Environment	Function	Component of Civic Stance	Limitations
Curricular content	Formation of knowledge about society, norms, and rights	Cognitive	Without active methods – low efficacy
Active teaching methods	Development of critical thinking and situational analysis	Cognitive + Motivational	Require a trained instructor
Extracurricular educational work	Practical experience of civic participation	Behavioural	Is often optional in nature
Student self-governance	Experience in decision-making and responsibility	Behavioural + Motivational	Depends on the body's actual influence
Volunteering	Development of empathy and social belonging	Emotional + Behavioural	Requires organisational support
University corporate culture	Formation of behavioural norms through the environment	All components	Is difficult to manage purposefully

Source: compiled by the author based on Law of Ukraine No. 1556-VII (2014), L. Kolomiiets *et al.* (2021), S. Marginson (2024), T.D. Fedirchuk & D. Tymchuk (2025)

The table demonstrated that each constituent of the educational environment predominantly covers a specific component of civic stance and possesses its own limitations. Curricula provide knowledge but do not substantiate the transition to activity. Extracurricular engagement and volunteering shape the behavioural and emotional dimensions, yet they affect only a portion of students due to their optional nature. Student self-governance constitutes an essential practical mechanism; however, its effectiveness is determined by the institutional conditions of the specific university. The institution's corporate culture influences all components simultaneously but is the

least controllable constituent among those listed. A university oriented towards shaping students' civic stance must deliberately integrate all these constituents rather than relying solely on individual ones. A comparison of the civic education systems of Ukraine, the USA, Great Britain, Germany, Finland, and Zambia reveals fundamentally different pathways for its organisation. In accordance with the criteria defined in the research methodology (the existence of a distinct compulsory course, the specificity of competence definition, and the integration of digital responsibility), the results of the comparison are presented in Table 5.

Table 5. Comparative analysis of civic education systems according to the defined criteria

Country	Distinct Compulsory Course	Level of Statutory Provision and Specificity of Competences	Integration of Digital Responsibility (Media Literacy, Ethics, Cybersecurity)
Ukraine	Absent (fragmentarily dispersed across humanities cycle disciplines)	Declarative (general programme outcomes within the framework of the Concept for Civic Education Development)	Initial (isolated modules on information hygiene without systematic skills verification)
USA	Present (courses in "Civics", "Government")	High (NCSS standards: clear description of expected knowledge in law and governance)	Medium (statutorily mandated media literacy in individual states' curricula)
Great Britain	Available ("Citizenship Education")	Advanced (National Curriculum: compulsory assessment at GCSE level)	Intermediate (focusing on digital activism and safety within social projects)
Germany	Present ("Citizenship Education")	High (National Curriculum: compulsory assessment at GCSE level)	Medium (focus on digital activism and safety within the scope of social projects)
Finland	Present (integrated from grade 4 as an independent block)	High (EDUFI National Framework: clear integration of transversal competences)	High (systematic instruction in critical thinking, countering cyber threats, and digital ethics)
Zambia	Present ("Civic Education")	Medium (integrated into the national development strategy: emphasis on citizens' duties)	Initial (focus on offline formats of civic participation; minimal digital component)

Source: compiled by the author based on Order of Cabinet of Ministers of Ukraine No. 710-r (2018), KMK (2022), NCSS (2023), C.C. Thelma (2024), Department for Education (2024), EDUFI (2024)

Analysis of the data in Table 5 indicates that in the USA, the UK, Germany, and Finland, citizenship education constitutes a distinct compulsory discipline with defined competences and expected learning outcomes. Finland demonstrates the highest level of integration of digital responsibility, aligning with its overall strategy of developing critical thinking as a cross-cutting competence. The experience of Zambia suggests that purposeful civic education, integrated into the national development system, contributes to raising the level of civic awareness among youth and their engagement in public life (Thelma, 2024). Conversely, in Ukrainian higher education, citizenship education remains dispersed across various humanities disciplines without a unified conceptual framework, with the result that the student assimilates separate elements of civic knowledge in different contexts without their systemic interconnection. The digital dimension of citizenship education requires separate consideration. Technological changes have substantially transformed the space in which young people form their own civic stance: a significant portion of social interaction has shifted to the online environment, where both new forms of civic participation emerge – such as digital activism, online petitions, and open public discussions – and new threats arise, associated with disinformation, manipulation, and cyberhate

(Hanandini, 2024). A university that fails to account for this dimension cultivates students' civic capacity limited to the offline environment, whereas the actual sociocultural life of young people unfolds to a considerable extent precisely within the network.

Contemporary pedagogical science increasingly emphasises that the student is an active agent in their own development. The concept of student self-formation posits that a young person constructs their own identity and civic stance independently, yet does so within a particular educational and social milieu, which the educational institution is capable of purposefully arranging (Marginson, 2024). The role of the university within this logic lies not in the direct imposition of values, but in creating conditions under which the student independently arrives at a conscious civic stance through experience, reasoning, and interaction with other members of the academic community. The university as an institution shapes students' civic stance not through discrete events or disciplines, but through the holistic environment in which the young individual resides over several years of study. The effectiveness of this environment is determined not by the quantity of educational activities, but by their quality, consistency, and capacity to impel the student towards genuine civic action beyond the university walls.

Pedagogical mechanisms for developing social responsibility in the context of societal transformations

In the context of martial law in Ukraine, accelerated digitalisation, and the re-evaluation of inherited societal values, a pedagogical mechanism is regarded as an aggregate of purposive conditions, principles, and instruments that ensure the formation of social responsibility as a stable personal characteristic of the student. Theoretical modelling of pedagogical mechanisms requires, first and foremost, the identification of those conditions under which the educative influence of the educational environment is effective. The first pedagogical condition is a value-oriented educational environment. A university where the declared values of responsibility, integrity, and civic engagement are genuinely reflected in rules, practices, and the behaviour of academic staff cultivates stable guiding principles in students far more effectively than one where a discrepancy exists between declarations and reality. The sociocultural approach to education views the university as a cultural space where the student internalises norms through participation in the shared life of the academic community. The second condition is the integration of reflective practices into the educational process. Without reflection, even the most active extracurricular engagement may remain superficial experience without deep personal internalisation. Pedagogical practices that incorporate systematic reflection – for instance, journals, group discussions, and portfolios – facilitate the formation of stable social responsibility (Hellison *et al.*, 2025). The third condition is the provision of genuine community practice as a mandatory component of the educational process. Theoretical knowledge about social responsibility does not transform into actual behaviour without the practical experience of acting within the public sphere. Engaging students in real social projects, civic initiatives, and volunteering activities provides that experience, which is impossible to replicate in the classroom (Kolomiiets *et al.*, 2021). The normative foundation for developing these forms of participation is the Decree No. 487/2021 (2021), which explicitly identifies the engagement of youth in volunteering and civic initiatives as a strategic priority of state policy. A necessary condition is that the student must perceive the significance of their own actions for specific people or the community. Among the pedagogical principles that ensure the effectiveness of social responsibility development, the principle of contextuality plays a key role. Educative influence is effective provided the content and forms of work correspond to the current social context of young people's lives. Under martial law, this principle acquires heightened significance, as students encounter situations of moral choice, social tension, and the need for collective interaction. Educational approaches that disregard these conditions and are oriented towards previous models lose their connection to the real-life experience of youth.

The principle of interdisciplinarity posits that the formation of social responsibility cannot be the task of a single

discipline or department but must encompass the entire educational process irrespective of the specialisation. A medical student, an engineer, or an economist equally requires developed social responsibility in their future professional activity. The Islamic pedagogical tradition, for example, regards the integration of environmental and social responsibility across all levels of education as a systemic principle rather than a separate subject (Hajar, 2024). An analogous approach is also pertinent for secular university education. Figure 2 depicts the delineated cycle of forming youth social responsibility, encompassing five interconnected stages: community practice as the initial experience, reflective comprehension of the experience gained, and awareness of one's own responsibility.

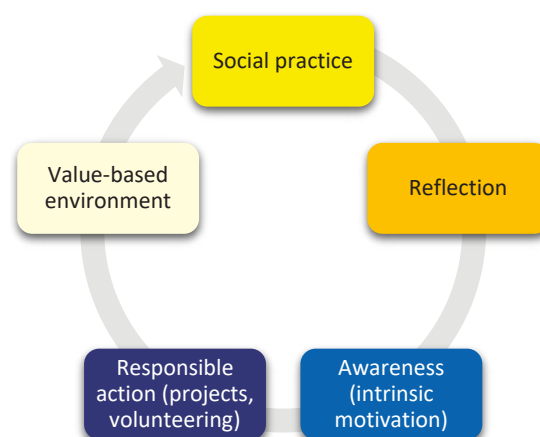


Figure 2. Model of the cyclical development of social responsibility

Source: created by the author based on L. Kolomiiets *et al.* (2021), D. Hellison *et al.* (2025)

The presented model illustrates the cyclical nature of social responsibility formation, where none of the stages is singular or terminal. The starting point is community practice – the real experience of student participation in volunteer projects, civic initiatives, or student self-governance. The experience gained proceeds through a stage of structured reflection, implemented via specific pedagogical instruments: self-observation journals record changes in one's own perception of social situations; portfolios document the dynamics of civic actions and enable tracing the link between personal decisions and their consequences for the community; group discussions provide peer feedback, which deepens the understanding of social interdependence. The outcome of such reflection is a qualitative shift in student behaviour: from the situational fulfilment of external demands to the conscious embracing of responsibility as one's own value stance, manifested in stable patterns of prosocial behaviour beyond the educational setting. A key element of the model is the university's value-based environment, which provides institutional support for reflection and furnishes a normative context for interpreting the experience gained. The cycle closes when a new responsible action generates new experience,

which again requires comprehension, thereby ensuring the progressive development of social responsibility at a qualitatively higher level.

The digital environment forms a distinct cluster of pedagogical mechanisms associated with the development of responsible behaviour in the online space. The generation of contemporary students has grown up with the internet as an integral part of social life, which determines the specificity of their internalisation of social norms and values. Research into the role of teachers and technology in the education of Generation Z confirms that the

digital environment is a space for the formation of social attitudes, where educational influence can be both amplified and neutralised by social media algorithms (Szymkowiak *et al.*, 2021). The pedagogical mechanism in this context entails the purposive formation of digital responsibility – a critical attitude towards information, awareness of the consequences of one's own online behaviour, and the development of skills for responsible communication within the network. Table 6 below systematises the pedagogical mechanisms for developing youth social responsibility in accordance with current societal challenges.

Table 6. Pedagogical mechanisms for developing youth social responsibility in conditions of societal transformations

Societal Challenge	Pedagogical Condition	Principle	Instruments
Martial law, social tension	A value-oriented environment	Contextuality	Volunteering, social projects, discussion of real-life situations
Digitalisation	Development of digital responsibility	Interdisciplinarity	Media literacy, online content analysis, digital activism
Re-evaluation of values	Integration of reflective practices	Student subjectivity	Diaries, portfolios, group discussions, case studies
Social fragmentation	Genuine social practice	Solidarity	Civic initiatives, intergroup projects, student self-governance
Information overload	Critical thinking as an educational component	Reflexivity	Source analysis, debates, problem-based learning

Source: compiled by the author based on L. Kolomiets *et al.* (2021), A. Szymkowiak *et al.* (2021)

An analysis of the table demonstrates that each societal challenge requires a specific pedagogical response, yet a common logic underpins all the mechanisms. In every case, effective pedagogical influence presupposes the student's active stance, a connection with the real social context, and the reflective processing of experience. None of the mechanisms is self-sufficient, as genuine social responsibility is formed at the intersection of a value-based environment, practical activity, and conscious reflection. The question of what the subject of pedagogical influence should be in contemporary conditions warrants particular attention. The traditional model, wherein the lecturer is the bearer of values and transmits them to the student, is gradually giving way to a facilitation model, where the educator organises an educational space in which the student independently arrives at an awareness of social responsibility through experience and reflection. This shift is of fundamental importance in circumstances where the authority of institutions, in general, is undergoing a crisis of trust. Young people who have grown up with access to diverse sources of information are less inclined to uncritically accept ready-made value systems and are more open to those developed through their own experience and contemplation. Physical activity and sport, although rarely considered in traditional pedagogical discourse as a mechanism for forming social responsibility, are a demonstrably effective tool for developing team responsibility, respect for rules, and a readiness for solidarity-based action. The model of teaching personal and social responsibility through physical activity demonstrates that even non-traditional educational spaces can be purposefully used to develop a socially responsible individual (Hellison *et al.*, 2025). A

necessary dimension of pedagogical mechanisms is also the issue of assessing the formation of social responsibility. Unlike subject-specific knowledge, social responsibility cannot be measured through standard tests or examinations. Pedagogical science proposes alternative forms of assessment, such as portfolios, self-assessment, peer assessment, and the analysis of real projects (Kolomiets *et al.*, 2021). The absence of adequate assessment tools is one of the factors hindering the systematic implementation of mechanisms for forming social responsibility in university practice. Thus, the pedagogical mechanisms for developing youth social responsibility in conditions of societal transformations must meet several key requirements. The mechanisms must be contextually sensitive, i.e., take into account the students' real social experience. The mechanisms must be systemic, encompassing the entire educational process. The mechanisms must ensure the student's active subjective stance through practice and reflection. Finally, the mechanisms must be adaptive, capable of responding to new challenges, such as digitalisation, social tension, and the shift in value orientations.

Pathways for improving civic education in the higher education system of Ukraine

At the level of state education policy, the primary task is to eliminate the fragmentation of civic education in Ukraine's higher education system. Comparative analysis has shown that in Ukraine, the content of civic education is fragmented across various humanities disciplines without a holistic approach (Thelma, 2024). The Order of Cabinet of Ministers of Ukraine No. 710-r (2018) declared the foundations for integrating civic education into educational programmes;

however, an analysis of the current state of affairs indicates that these foundations remain largely declarative and have not acquired the character of a mandatory, systemic course in higher education. In contrast, in countries such as Great Britain, Germany, Finland, and the USA, civic education is represented as a distinct compulsory course with clear competencies and expected outcomes (Kolomiiets *et al.*, 2021). In this regard, it is proposed to develop a single, systematic civic education course for higher education institutions. It should be based on three core modules: legal literacy, the foundations of democratic governance, and digital responsibility. The latter component particularly needs to be included in state educational standards, as the digital space is becoming a vital part of young people's social life, especially in the context of contemporary informational challenges caused by the war. It is also important to include indicators of students' civic participation (volunteering, student self-governance, participation in civic initiatives) in the accreditation criteria for universities. This will encourage educational institutions to work more actively towards fostering civic consciousness.

At the level of university institutions, the key task is to create a value-based environment by overcoming the contradictions between the declared principles and the actual behaviour of the administration and teaching staff. Such a discrepancy significantly diminishes the educational effect of pedagogical activity. It is recommended to conduct regular monitoring of the alignment of declared university values with actual practice, with the participation of students and lecturers. An important direction is also the expansion

of the real powers of student self-governance bodies, which should acquire the status of not merely an advisory body but also become an active instrument of democratic practice. This will provide students not only with theoretical knowledge about civic responsibility but also with practical experience of its realisation. Furthermore, it is worth introducing community-oriented practice as a compulsory component of programmes for all specialities. Such practice, being part of the curriculum with corresponding academic credits, can be implemented through cooperation with civic organisations, local authorities, and social institutions. At the pedagogical level, it is necessary to transform the role of the lecturer from a passive bearer of knowledge and values to a facilitator of the educational process. Contemporary reality has provided students with broad access to information and diminished the influence of the authority of traditional institutions. Therefore, conditions should be created so that students can arrive at an awareness of their civic stance through their own experience and analytical contemplation. To this end, it is recommended to actively integrate reflective learning methods into the educational process: group discussions, the analysis of moral dilemmas, and keeping personal diaries or portfolios. These methods will contribute to the formation of a stable internal system of values and beliefs. Particular attention should be paid to the training of lecturers, equipping them with skills in facilitation, critical thinking, and working with youth in crisis situations. A summarising Figure 3 is presented below, depicting the system of recommendations in the form of a three-level structure of pedagogical mechanisms.

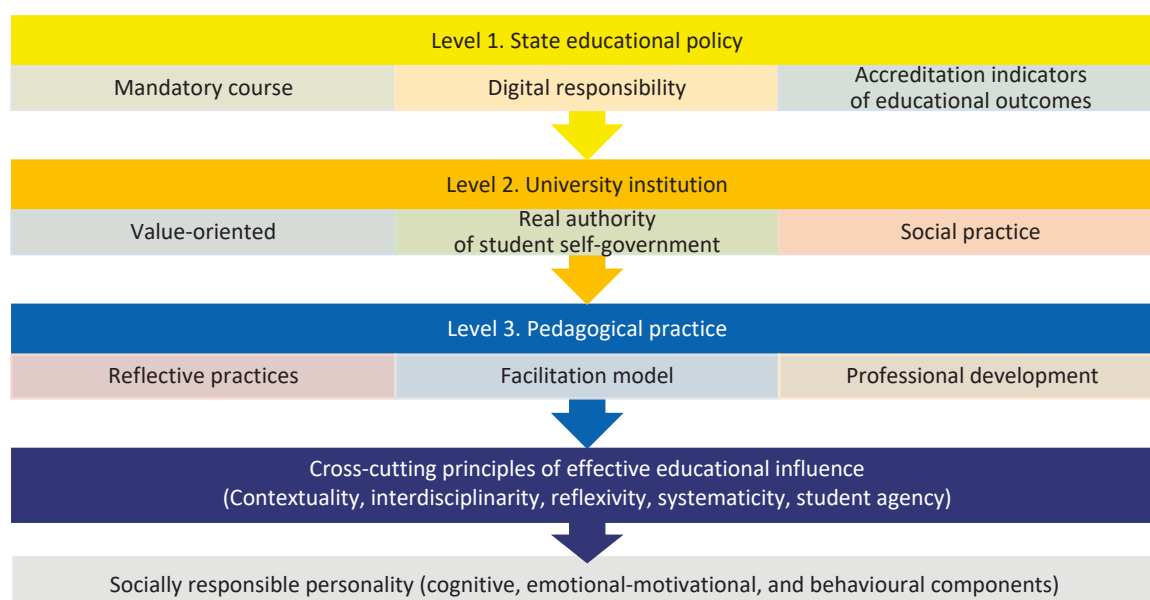


Figure 3. A three-level structural model for cultivating social responsibility in a higher education institution

Source: created by the author based on Order of Cabinet of Ministers of Ukraine No. 710-r (2018), President of Ukraine (2021), L. Kolomiiets *et al.* (2021), S. Marginson (2024), T. Fedirchuk & D. Tymchuk (2025)

This model demonstrated that the effective formation of young people's social responsibility is possible only through the coordinated interaction of three levels: state

policy, which establishes the normative framework; university institutions, which provide a value-oriented environment and the practical component; and direct pedagog-

ical interaction, where the student's internal acceptance of responsibility occurs through reflective methods. The key conclusion is that none of the levels can be effective in isolation. For instance, even with perfect state policy, without trained facilitator-educators or genuine powers vested in student self-governance, the formation of a stable civic stance remains merely declarative (Marginson, 2024). Thus, the effective formation of young people's social responsibility under contemporary conditions is possible only through the transformation of education from an informational system into a space of authentic social experience. Achieving this goal requires coordinated interaction at three levels: at the state level, the development of a clear normative strategy for civic education; at the institutional level, ensuring the correspondence of declared university values with actual practice; and at the pedagogical level, the educator's realisation of the role of facilitator of the educational process. The integration of legal knowledge with the practical experience of civic participation through volunteering and student self-governance, reinforced by the reflective comprehension of one's own actions, creates the preconditions for the emergence of a generation capable of conscious and responsible participation in public life – in both the physical and digital dimensions.

DISCUSSION

The substantiation of social responsibility as a tripartite quality encompassing cognitive, emotional-motivational, and behavioural dimensions broadly resonates with the stance of D. Hellison *et al.* (2025), who insisted that social responsibility manifests primarily in actual behaviour and intrinsic motivation. At the same time, the model by the researchers was developed within the context of physical education and is predominantly grounded in the behavioural component, effectively assigning a secondary role to the cognitive dimension. Such a narrowing is justified for a sports environment, where a skill is formed through repeated action; however, in the context of university education, where the reflective and analytical components are central, this reduction appears insufficient. The conducted study expands this model by insisting on the equivalence of all three components and the impossibility of forming stable social responsibility through the targeted development of only one of them. It is also important to note that the model by the authors was tested primarily in working with at-risk youth in out-of-school settings, whereas the university audience is characterised by a higher level of cognitive maturity and a capacity for abstract thinking. This confirms the necessity of adapting existing models to the specificities of higher education rather than mechanically transferring approaches developed for other educational contexts.

The author J. Abbas (2025) proposed a shift from corporate social responsibility to human social responsibility as a broader paradigm encompassing individual, institutional, and societal dimensions. Despite the conceptual appeal of this idea, its pedagogical application remains problematic. Expanding the concept to a pan-human paradigm

risks blurring the specific mechanisms through which the educational environment influences a young person's behaviour, thereby transforming a pedagogical problem into a philosophical one. The conducted study refrains from such a generalisation, focusing instead on operationalised pedagogical conditions that are amenable to targeted management by the university as an institution. At the same time, the approach by J. Abbas (2025) is valuable insofar as it accentuates the societal dimension of responsibility, moving beyond an individualistic psychological model. This emphasis aligns with the findings of the conducted study concerning the institutional mechanisms for fostering responsibility: the university is regarded not merely as an environment for individual development but also as a societal institution bearing collective responsibility for the quality of civic upbringing.

The study by A.S. Anvarovna (2026) confirmed the advantage of interactive teaching methods over traditional lecture formats in developing students' social engagement; however, the researcher primarily records an increase in the level of engagement, whereas the question of the link between engagement and actual socially responsible behaviour beyond the classroom remains open. This conclusion is fundamentally important for understanding the limitations of classroom-based learning as such: increasing engagement during a session is a necessary but insufficient condition for forming stable social responsibility. The conducted study supplements this conclusion by substantiating the necessity of moving beyond the classroom environment through the involvement of students in authentic community practice as a mandatory component of the educational process. A similar caveat applies to the conclusions of U. Baizakova *et al.* (2026), who established that the quality of interaction between students and educators is a predictor of socially responsible behaviour in future teachers. Teaching specialities are atypical in the sense that the professional role of the future teacher organically incorporates social responsibility as a professional norm; therefore, extending this pattern to all university specialities requires separate empirical verification, which remains a task for further research. Concurrently, the conclusions of authors indirectly confirm the significance of the value-oriented environment as a pedagogical condition identified in the conducted study: the quality of interpersonal interaction at the university shapes the normative context within which the student internalises models of responsible behaviour.

A comparison with the study by L. Astuti & A. Winarti (2026) on moral education in Islamic boarding schools reveals a fundamental theoretical contradiction between the logic of closed and open educational systems. The authors established that the integrity of the educational environment – i.e., the complete coverage of all aspects of daily life with unified value guidelines – ensures the highest effectiveness in forming stable social attitudes. A university fundamentally does not control the entirety of a student's social space and cannot ensure an analogous

integrity of influence, which calls into question the very possibility of achieving comparable effectiveness in an open educational system. The conducted study proposes an alternative logic, whereby the openness of the university is simultaneously its limitation and its advantage, for it is within an open environment that the student forms social responsibility through personal choice rather than through external control. It is precisely this circumstance that renders the formed responsibility more stable in the long term, as it does not depend on the preservation of the institutional environment in which it was produced. The study by A. Deif & L. Cochrane (2026) on practice-oriented educational models for youth with disrupted educational trajectories is particularly relevant to the Ukrainian context; however, a significant difference exists between the situation described by the authors and the realities of Ukrainian universities. Whereas the study by authors concerns the adaptation of individual vulnerable students with personally disrupted trajectories, in Ukraine, the university is dealing with an entire student generation simultaneously experiencing collective social trauma. The scale and collective nature of this experience substantially alter the pedagogical task and require tools oriented not towards individual rehabilitation but towards the formation of new norms of collective responsibility under conditions of a radical rethinking of traditional societal institutions. The practice-oriented approach substantiated by researchers, nevertheless, retains its relevance as a methodological principle, since the authentic experience of social action is a necessary condition for fostering responsibility regardless of the nature of the social context.

Author V. Terziev (2026) emphasised that, under conditions of systemic crisis, social responsibility ceases to be merely a personal quality and becomes a necessary condition for the functioning of social institutions as a whole, thereby conferring upon the university's educative function the status of a strategic societal priority. This conclusion is theoretically significant; however, it entails a risk that requires pedagogical reflection. Transforming the university into an instrument of societal mobilisation may conflict with academic autonomy and critical thinking as fundamental values of higher education. The present study overcomes this contradiction through the principle of student agency, whereby the university does not impose value orientations but rather creates conditions in which a young person independently arrives at a conscious civic stance through experience and reflection. Thus, the strategic societal priority of the university's educative function is realised not through the directive formation of loyalty to particular values, but through the development of the student's capacity for independent moral judgment and responsible choice. On the whole, the comparative analysis demonstrates that leading scholars across different research contexts emphasise the necessity of practice-oriented, reflexive, and contextually sensitive approaches to fostering social responsibility in youth, and in this sense, the findings of the present study align with the mainstream

of contemporary pedagogical thought. At the same time, the study highlights the systemic nature of pedagogical mechanisms under the specific Ukrainian realities of martial law, digitalisation, and the rethinking of national identity, which constitutes its original contribution to the elaboration of this issue and delineates the horizon for further scholarly inquiry.

CONCLUSIONS

The results of the study revealed that social responsibility is an integral personal quality functioning as a unity of three interdependent components: cognitive (understanding of societal norms and the consequences of one's own actions), emotional-motivational (an internal impetus for responsible behaviour driven by empathy and a sense of belonging to the community), and behavioural (concrete actions aimed at supporting others and society at large). Data analysis demonstrated that pedagogical influence focused solely on one of these components does not ensure the formation of stable social responsibility – their holistic and coherent development is essential.

The university emerges as an institutional mechanism for shaping students' civic stance, realised through six structural elements of the educational environment: curriculum content, active learning methods, extracurricular educative work, student self-government, volunteering, and the institution's corporate culture. The analysis showed that these elements affect the components of social responsibility in different ways: curricula form the cognitive foundation, yet without a practical component they do not ensure the transition to actual responsible behaviour; student self-government develops the behavioural and motivational dimensions, but only on the condition that the student body is vested with real authority; volunteering simultaneously encompasses the emotional and behavioural components, which renders it the most comprehensive pedagogical tool. Analysis of the regulatory and legal framework confirmed the existence of declarative foundations for civic education but revealed a deficit of mandatory institutional mechanisms for their practical implementation. Students' stable social responsibility is formed only when all elements of the university environment act in a coherent and purposeful manner, rather than as disparate educative activities.

A comparative analysis of the experience of Ukraine, the United States, the United Kingdom, Germany, Finland, and Zambia identified substantial differences in approaches to organising civic education. In Ukraine, civic education is predominantly dispersed across various disciplines without a unified conceptual framework, whereas in many countries it constitutes a distinct, systematic course with clearly defined learning outcomes. It has been confirmed that, under the current societal transformations – martial law, digitalisation, and the rethinking of values – the pedagogical mechanisms for fostering social responsibility require systemic renewal. Three key pedagogical conditions for effective educative influence were established: the

creation of a value-oriented environment, the mandatory integration of reflexive practices (through the use of portfolios and self-reflection journals), and the provision of genuine community practice as a compulsory component of learning. It was determined that digital responsibility constitutes a new, autonomous dimension of youth social responsibility, the cultivation of which must be deliberately integrated into the educational strategies of universities. The proposed three-tier structural model (state, institutional, and pedagogical levels) demonstrated that the highest effectiveness can be achieved only through their coordinated interaction: at the state level – by introducing a unified mandatory civic education course and incorporating civic participation indicators into accreditation criteria; at the institutional level – by extending the real authority of student self-government and making community-oriented practice compulsory; at the pedagogical level – by transitioning the instructor to the role of a

facilitator and systematically applying reflexive teaching methods. The theoretical generalisations, built upon the analysis of scholarly sources, require further verification in actual pedagogical practice. Future research in this area should be directed towards the empirical verification of the identified pedagogical mechanisms through quantitative and qualitative methods, specifically student questionnaires, expert surveys, and the analysis of concrete university practices.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Abbas, J. (2025). From corporate social responsibility to human social responsibility: A pathway for a sustainable society. *Journal of Cleaner Production*, 494, article number 144979. doi: 10.1016/j.jclepro.2025.144979.
- [2] Anvarovna, A.S. (2026). *Interactive pedagogical approaches as a key factor in the formation of social and emotional competence in higher education institutions*. In *London international monthly conference on multidisciplinary research and innovation (LIMCMRI)* (pp. 51-58). London: World Science Publishing LTD.
- [3] Astuti, L., & Winarti, A. (2026). Moral education in Islamic boarding schools for shaping the social character of adolescents. *Al-Hayat: Journal of Islamic Education*, 10(1), 20-36. doi: 10.35723/ajie.v10i1.220.
- [4] Baizakova, U., Mailybaeva, G., Kaldybaeva, A., Nugmanova, F., & Zheksembayeva, Z. (2026). Socio-psychological peculiarities of professional formation of a future teacher of general education school in modern conditions. *Educational and Developmental Psychologist*, 43(1), 129-140. doi: 10.1080/20590776.2025.2584819.
- [5] Byun, G., Lee, G., & Ha, M. (2026). How public libraries reach out to adolescents: A study of adolescents' perceptions of teen spaces in Korean public libraries. *Journal of Asian Architecture and Building Engineering*, 25(1), 233-246. doi: 10.1080/13467581.2025.2455025.
- [6] Department for Education. (2024). *National curriculum in England: citizenship programmes of study*. Retrieved from <https://www.gov.uk/government/publications/national-curriculum-in-england-citizenship-programmes-of-study>.
- [7] Decree No. 487/2021 "On the National Strategy for Promoting the Development of Civil Society in Ukraine for 2021-2026". (2021, September). Retrieved from <https://surl.li/akerth>.
- [8] Deif, A., & Cochrane, L. (2026). Social and solidarity economy (SSE) approach for technical and vocational education training (TVET) empowering youth with disrupted education. *Education + Training*, 68(3), 386-408. doi: 10.1108/ET-08-2025-0671.
- [9] EDUFI. (2024). *National core curriculum for basic education: Transversal competences*. Retrieved from <https://surl.li/arsonf>.
- [10] Fedirchuk, T.D., & Tymchuk, D.R. (2025). Development of social responsibility of students in the educational environment of the university. *Pedagogical Academy: Scientific Notes*, 25, 1-22. doi: 10.5281/zenodo.18117843.
- [11] Garan, N. (2026). Youth centers as institutions for forming the civic competence of youth students. *Humanization of the Educational Process*, 1(109), 16-27. doi: 10.31865/2077-1827.1(109)2026.353645.
- [12] Hajar, A. (2024). Transforming Islamic education for environmental and social sustainability. *Sinergi International Journal of Islamic Studies*, 2(2), 82-95. doi: 10.61194/ijis.v2i2.601.
- [13] Hanandini, D. (2024). Social transformation in modern society: A literature review on the role of technology in social interaction. *Jurnal Ilmiah Ekotrans & Erudisi*, 4(1), 82-95. doi: 10.69989/j0m6cg84.
- [14] Hellison, D., Wright, P.M., Martinek, T.J., & Walsh, D.S. (2025). *Teaching personal and social responsibility through physical activity (4th ed.)*. Champaign: Human Kinetics.
- [15] Hong, W.C.H., Chi, C., Liu, J., Zhang, Y., Lei, V.N.L., & Xu, X. (2023). The influence of social education level on cybersecurity awareness and behaviour: A comparative study of university students and working graduates. *Education and Information Technologies*, 28(1), 439-470. doi: 10.1007/s10639-022-11121-5.
- [16] Jamatia, P.L. (2023). The role of youth in combating social inequality: Empowering the next generation. *International Journal of Social Science, Educational, Economics, Agriculture Research and Technology*, 2(8), 229-238. doi: 10.55529/jills.26.11.20.

- [17] KMK. (2022). Retrieved from https://www.kmk.org/fileadmin/Dateien/pdf/PresseUndAktuelles/2018/Beschluss_Demokratieerziehung.pdf.
- [18] Kolomiiets, L., Shulga, G., & Lebed, I. (2021). Formation of social responsibility of young people in the process of obtaining higher education. In *Society. Integration. Education. Proceedings of the international scientific conference* (pp. 292-305). Rēzekne: RTU Rēzekne Academy. doi: [10.17770/sie2021vol1.6417](https://doi.org/10.17770/sie2021vol1.6417).
- [19] Law of Ukraine No. 1556-VII "On Higher Education". (2014, July). Retrieved from <https://zakon.rada.gov.ua/go/1556-18>.
- [20] Law of Ukraine No. 2145-VIII "On Education". (2017, September). Retrieved from <https://zakon.rada.gov.ua/go/2145-19>.
- [21] Lin, M., Chu, M., Li, X., Ma, H., Fang, Z., Mao, L., & Chiang, Y. C. (2023). Factors influencing adolescent experimental and current smoking behaviors based on social cognitive theory: A cross-sectional study in Xiamen. *Frontiers in Public Health*, 11, article number 1093264. doi: [10.3389/fpubh.2023.1093264](https://doi.org/10.3389/fpubh.2023.1093264).
- [22] Marginson, S. (2024). Student self-formation: An emerging paradigm in higher education. *Studies in Higher Education*, 49(4), 748-762. doi: [10.1080/03075079.2023.2252826](https://doi.org/10.1080/03075079.2023.2252826).
- [23] McGorry, P.D., Mei, C., Dalal, N., Alvarez-Jimenez, M., Blakemore, S.J., Browne, V., & Killackey, E. (2024). The lancet psychiatry commission on youth mental health. *The Lancet Psychiatry*, 11(9), 731-774. doi: [10.1016/S2215-0366\(24\)00163-9](https://doi.org/10.1016/S2215-0366(24)00163-9).
- [24] Moroz, I.M., & Kayun, V.O. (2025). The role of historical education in the formation of the civic identity of young people. *Bulletin of Humanitarian Sciences*, 12, 1-21. doi: [10.5281/zenodo.17438988](https://doi.org/10.5281/zenodo.17438988).
- [25] NCSS. (2023). *The college, career, and civic life (C3) framework for social studies state standards*. Retrieved from <https://www.socialstudies.org/standards/c3>.
- [26] Order of Cabinet of Ministers of Ukraine No. 710-r "Concept of development of civic education in Ukraine". (2018, October). Retrieved from <https://zakon.rada.gov.ua/laws/show/710-2018-%D1%80#Text>.
- [27] Singh, R. (2025). [Youth and cultural shift: Impact on social responsibilities](#). *Idealistic Journal of Advanced Research in Progressive Spectrums (IJARPS)*, 4(3), 98-101.
- [28] Syysiuk, O. (2026). The social role and significance of religion for Ukraine today: Historical dynamics and current contributions. *Occasional Papers on Religion in Eastern Europe*, 46(1), article number 5. doi: [10.55221/2693-2229.2746](https://doi.org/10.55221/2693-2229.2746).
- [29] Szymkowiak, A., Melovic, B., Dabic, M., Jeganathan, K., & Kundi, G.S. (2021). Information technology and Gen Z: The role of teachers, the internet, and technology in the education of young people. *Technology in Society*, 65, article number 101565. doi: [10.1016/j.techsoc.2021.101565](https://doi.org/10.1016/j.techsoc.2021.101565).
- [30] Tabrizi, J.S., Doshmangir, L., Khoshmaram, N., Shakibazadeh, E., Abdolahi, H.M., & Khabiri, R. (2024). Key factors affecting health promoting behaviors among adolescents: A scoping review. *BMC Health Services Research*, 24(1), article number 58. doi: [10.1186/s12913-023-10510-x](https://doi.org/10.1186/s12913-023-10510-x).
- [31] Terziev, V. (2026). Modern social systems in conditions of permanent crisis: Transformations, dysfunctions, and the role of socially dominant leaders. *Journal of Social Sciences*, 3(2), 117-130. doi: [10.61552/SJSS.2026.02.007](https://doi.org/10.61552/SJSS.2026.02.007).
- [32] Thelma, C.C. (2024). Civic education and national development: A comprehensive analysis of Zambia. *Asian Journal of Education and Social Studies*, 50(6), 170-190. doi: [10.9734/ajess/2024/v50i61404](https://doi.org/10.9734/ajess/2024/v50i61404).
- [33] Vynola, R.H., Druz, H.M., & Voroshchuk, O.D. (2025). The role of social education in the formation of civic consciousness and social responsibility of the youth of Ukraine. *Pedagogical Academy: Scientific Notes*, 21, 1-22. doi: [10.5281/zenodo.17002460](https://doi.org/10.5281/zenodo.17002460).
- [34] Wahda, S., Meliala, F.M.B.S., Tarigan, M.I.B., Maha, N.D., & Siregar, H.L. (2026). The impact of social media on changes in behavior and morality of adolescents from the perspective of Islamic education: A study on Unimed students. *Mauve Journal De Leardu*, 3(1), 27-38. doi: [10.37899/mjdl.v3i1.315](https://doi.org/10.37899/mjdl.v3i1.315).

Василь Дудар

Кандидат історичних наук, професор
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0001-6064-9408>

Освіта як чинник формування соціальної відповідальності молоді в умовах сучасних суспільних трансформацій

Анотація. Метою дослідження було визначення педагогічних механізмів розвитку громадянської активності студентів та аналіз ролі вищої школи як інституційного чинника становлення соціально відповідальної особистості в період динамічних змін суспільного устрою. У дослідженні застосовано системний підхід, структурно-функціональний аналіз, порівняльний метод, нормативно-правовий аналіз та контент-аналіз наукових джерел і стратегічних документів зарубіжних країн. За результатами дослідження встановлено, що соціальна відповідальність молоді є трикомпонентною якістю, яка поєднує когнітивний, емоційно-мотиваційний та поведінковий виміри, причому розвиток лише одного з них не забезпечує формування стійкої відповідальної поведінки. Виявлено шість структурних елементів університетського середовища, що по-різному впливають на становлення громадянської позиції студентів, зокрема зміст навчальних програм, активні методи навчання, позааудиторна діяльність, студентське самоврядування, волонтерська робота та інституційна культура закладу. Визначено, що в Україні громадянська освіта є фрагментарною порівняно з систематизованими підходами Великої Британії, Німеччини, Фінляндії, США і Замбії, де відповідна підготовка реалізується як окремий обов'язковий курс із чітко визначеними компетентностями. Констатовано, що цифрова відповідальність є самостійним новим виміром соціальної відповідальності молоді, який потребує цілеспрямованого педагогічного опрацювання. Розроблено комплекс пропозицій для підвищення ефективності формування громадянської свідомості в системі вищої освіти на різних рівнях її організації. ціннісно орієнтоване середовище, інтеграція рефлексивних практик та обов'язкова реальна суспільна практика. Практична значимість отриманих результатів полягає у можливості їх використання при розробці університетських стратегій виховної роботи, оновленні змісту навчальних програм та формуванні державної освітньої політики у напрямі системного виховання громадянськості

Ключові слова: просоціальна поведінка; моральна свідомість; молодіжні центри; цифровий активізм; рефлексивні практики; психолого-педагогічні чинники

**Olena Dudar***

PhD in Psychological Sciences, Associate Professor
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0000-0003-0541-5646>

Yaroslav Shchogolev

Senior Lecturer
Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlynskoh Str., Pereiaslav, Ukraine
<https://orcid.org/0009-0007-7814-638>

Educational communications in the digital society: New formats of interaction between lecturer and student

Abstract. The study aimed to determine the impact of digital technologies on the nature and organisation of interactions between lecturers and students in modern education. The research methodology included a theoretical analysis of scholarly sources, comparative analysis, systems analysis, systematisation and generalisation. The results indicate a steady increase in the effectiveness of digital educational communications. This is evidenced by the rise in participation in online learning, which increased from 21.4% to 34.8% in the European Union, and the high level of integration of Learning Management Systems. These systems are used regularly by approximately 78% of students. Synchronous formats were found to be most effective when explaining complex material and providing immediate feedback, while asynchronous environments and combined platforms were more effective in developing student autonomy, in-depth engagement with educational content, and organising group interaction. Student-centred, collaborative and connectivist approaches contribute to developing student independence and intensifying their interaction. These approaches enable the combination of individual learning and team-based activity, creating conditions for a flexible educational process. Digital platforms were found to provide automated, personalised assessment of students' learning achievements. They enable the provision of timely feedback and dynamic progress monitoring. They also facilitate the organisation of group work through collaborative projects and discussions. Taken together, these factors improve the quality of educational interaction. Videoconferencing ensures direct contact between participants in the learning process and enables immediate feedback. The results of the study may be used by lecturers, the administration of higher education institutions and developers of educational programmes to improve the organisation of digital educational communication and enhance the effectiveness of interaction between lecturer and student

Keywords: information dissemination; pedagogical function; multimedia content; forum discussions; knowledge transfer

INTRODUCTION

The digitalisation of education is transforming the way lecturers and students interact, creating new communication models based on interactivity, mobility, and rapid information exchange. Educational communication is increasingly

taking place through online platforms, social networks, video conferencing and digital services. This affects the organisation of the learning process, the level of student engagement, and the methods of knowledge transfer. In this

Suggested Citation:

Dudar, O., & Shchogolev, Ya. (2026). Educational communications in the digital society: New formats of interaction between lecturer and student. *Scientia et Societatis*, 5(1), 102-114. doi: 10.69587/ss/1.2026.102.

*Corresponding author (dudarlenushka@gmail.com)



context, studying new formats of interaction between lecturers and students is important because they influence the effectiveness of learning, the quality of feedback, and the potential for personalising the educational environment.

In the context of digital society, educational communications have undergone transformations as a result of the spread of digital technologies. This has contributed to the formation of new interaction formats between lecturers and students, as well as changing approaches to organising the learning process. R. Cramarenco *et al.* (2023) reviewed students' perceptions of online education and digital technologies during the pandemic. The researchers concluded that using digital platforms ensures the continuity of the educational process and expands the possibilities for communication between those involved in learning. However, they also found that the effectiveness of interaction depends on lecturers' digital preparedness, how the learning environment is organised, and the ability to maintain an active dialogue with students. Similar trends are reflected in the study by S. Salarvand *et al.* (2023), which highlighted communication and collaboration difficulties in online classrooms. The scholars established that distance learning is accompanied by decreased emotional interaction, insufficient non-verbal communication, and limited opportunities for immediate feedback. However, it was also demonstrated that interactive teaching methods and the use of digital services can activate students' participation in the learning process. M. Laskar (2023) work examined the issue of digital inequality, presenting a comparative analysis of the development of digital society in urban and rural regions of India. The author found that access to digital resources directly affects students' opportunities to participate in the learning process and communicate with lecturers. Insufficient technical provision and limited internet access complicate distance learning, thereby exacerbating educational inequality. In this regard, digital communications are considered not only as a learning tool, but also as a means of social integration and improving educational accessibility.

The adaptation of educational programmes to the conditions of digital society was examined in a study by A. Lazareva *et al.* (2024). The researchers demonstrated that updating learning content and introducing digital interaction formats contributes to improving the effectiveness of the educational process in Ukraine. They also paid attention to the development of digital literacy among lecturers and students, which they regard as a necessary condition for high-quality educational communication. These results are consistent with the conclusions of J. Tondeur *et al.* (2023), who proposed the concept of digital competence for lecturers in higher education institutions. This approach emphasises that a lecturer's ability to use digital tools, maintain interactive engagement, and adapt teaching methods to the online environment determines the effectiveness of educational communication. L. Mialkovska *et al.* (2023) also investigated the issue of digital communications in higher education. The scholars demonstrated that social

management and digital communication have become integral to the functioning of higher education institutions. Digital platforms facilitate the rapid exchange of information, the coordination of educational activities, and interaction between all participants in the learning process. However, it was also found that the effectiveness of digital communication depends on the organisation of the information environment and the willingness of lecturers to use new interaction formats. M. Ohara (2023) analysed the role of social networks in the system of educational communication. It was determined that social media facilitate constant contact between lecturers and students, ensure the rapid dissemination of information, and intensify learning interactions.

O. Yemelyanova *et al.* (2023) examined the problems of the educational crisis in the information and digital society. They concluded that changes in communication methods necessitate a rethinking of traditional teaching approaches and the development of new lecturer-student interaction models. Conversely, N. Nychkalo *et al.* (2024) demonstrated that the use of digital tools facilitates the integration of Ukrainian children and young people into Slovakia's educational environment. This shows that digital communication not only organises the learning process, but also maintains social adaptation and intercultural interaction. Meanwhile, J. Vega-Ramírez *et al.* (2023) investigated how educational policy outcomes are communicated in the context of digital society. They established that effective dissemination of information and use of digital communication channels influences the level of public engagement in educational processes. They considered digital communication to be a multi-level system of interaction, encompassing not only lecturers and students, but also the wider educational environment. Despite the points raised by the aforementioned authors, there has been insufficient research into the impact of new digital formats of interaction on the quality of communication between lecturers and students. The specific features of combining interactive platforms, social networks, and distance services within a single educational environment have only been analysed to a limited extent. Insufficient attention has been given to maintaining effective feedback and encouraging students' communication in the digital learning space. This study aimed to determine the role of digital technologies in transforming interaction between lecturers and students. The study aimed to characterise the specific features of digital educational communication, assess the effectiveness of modern interaction formats in the educational process, and conduct a comparative analysis of pedagogical communication models in the digital environment.

MATERIALS AND METHODS

The research design adopted a mixed-methods approach combining theory and analysis. This included a systems analysis of scholarly sources, a comparative examination of models of pedagogical interaction, and the generalisation of statistical data on the use of digital educational

platforms in the context of online education. A theoretical analysis of scholarly sources on the organisation of educational communications in digital societies was conducted, focusing particularly on formats of digital communication in online education and the functional capabilities of digital educational platforms. Scholarly sources were searched for in the international academic databases Google Scholar, Scopus and Web of Science. Sources were selected according to criteria including relevance, scholarly validity, representativeness with regard to digital educational communications, availability of empirical data, and correspondence with the topic of synchronous and asynchronous forms of learning interaction. The study analysed synchronous and asynchronous forms of learning interaction, tools for providing feedback and approaches to organising group and individual learning activities in a digital educational environment. Additionally, statistical data was presented, including the level of user participation in online learning within European Union countries, growth dynamics in the use of digital educational materials between 2019 and 2025, indicators of uneven digital engagement, and the frequency with which Learning Management Systems (LMSs) are used by students. The material basis of the study consisted of official statistical reports by Eurostat (European Commission, 2026) and analytical materials from the Ministry of Digital Transformation of Ukraine (2025).

The comparative method was used to analyse traditional and digital formats of pedagogical interaction. The teacher-centred communication model (Ghafar, 2023), the student-centred communication model (Europass Teacher Academy, 2024), the collaborative learning model (Education Endowment Foundation, n.d.) and the connectivist communication model (Pace, 2026) were compared within the study. The comparison was carried out according to criteria such as the level of interactivity, effectiveness of feedback, degree of student autonomy, opportunities for collaborative work organisation, and use of digital tools in the learning process. This approach revealed the advantages of digital communication formats in facilitating flexible and interactive engagement between participants in the educational process.

Systems analysis was used to study the functional capabilities of digital educational platforms within the online education system. This covered Moodle (n.d.), Google Classroom (n.d.), Microsoft Teams (n.d.), Zoom (n.d.) and Canvas (n.d.). Tools for synchronous and asynchronous communication, group work organisation, feedback mechanisms, digital assessment and multimedia content integration were analysed during the study. This enabled the specific features of using digital platforms to ensure effective pedagogical interaction and optimise communication between lecturers and students to be determined. A method of systematisation and generalisation based on scholarly sources was employed to classify digital educational communication formats and determine their pedagogical functions. The specific features of using chats, forums,

videoconferencing, interactive whiteboards and learning management systems in the modern educational environment were identified using the method of systems analysis. One limitation of the study was that the analysis was mainly based on open statistical data and scholarly sources from the last five years. This may not fully reflect the rapid changes in digital educational technologies and how they are implemented in different countries and educational institutions.

RESULTS

In the digital society, educational communications are formed as a system of interaction between lecturer and student. This system combines synchronous and asynchronous methods of information exchange, organisation of learning activities, and support for feedback. Synchronous methods enable real-time interaction, facilitating explanations of educational material, clarification of complex issues, demonstration of examples, and prompt checking of understanding. Asynchronous methods allow for an individual pace of work, repeated engagement with educational content, and extended written interaction. This contributes to a deeper understanding of the material and the formation of stable knowledge. Digital platforms' functional capabilities determine the organisation of the educational process by structuring educational content, placing assignments, conducting assessment and recording learning outcomes (Epitech, n.d.). These environments provide a unified system for accessing educational materials and communication tools, enabling both individual and group work within a single course. One such component is support for various channels of interaction, including individual consultations, group discussions, and automated forms of knowledge assessment. This creates a multi-level structure within the educational process.

Official statistical data shows a steady increase in the use of digital educational formats in Europe and around the world. According to Eurostat, 34.8% of internet users in EU countries participated in online courses or used digital learning materials in 2025, compared to 33.4% in 2024 and 21.4% in 2019. This indicates the gradual institutionalisation of digital learning as part of educational practice. However, uneven participation across countries is evident: in the Netherlands, for example, the level of engagement in online learning exceeds 60%, whereas in some Eastern European countries this figure is lower, reflecting digital inequality in access to educational technologies (European Commission, 2026).

One aspect of digital educational communication is the use of LMSs, which organise the learning process and provide access to materials, communication, and control of learning outcomes. Studies in the United States indicate that LMS implementation is widespread: up to 98% of educational institutions use such platforms, and approximately 78% of students regularly log in to complete tasks and interact with lecturers (ZipDo, 2026). Concurrently, the average student activity level in these systems is characterised by regular logins throughout the week and

lengthy learning sessions, indicating the integration of digital tools into everyday educational practice. Overall, these data confirm that digital educational communications are becoming systemic, ensuring flexibility and continuity of learning, as well as expanding opportunities for interaction between lecturers and students in the modern educational environment.

By 2025, Ukraine's education system will have undergone significant digital transformation, characterised by high levels of digital activity among the population and rapid development of educational platforms. According to the Ministry of Digital Transformation of Ukraine, 96% of Ukrainians possess digital skills and 58% have a basic level of digital literacy, corresponding to the EU average. Furthermore, 42% of adults and 70% of adolescents utilise artificial intelligence tools for learning and everyday activities, highlighting the integration of digital communication into the educational process (Ministry of Digital Transformation of Ukraine, 2025). Ukraine is actively developing online learning infrastructure and distance education platforms in the context of digital education. Analytical materials on the digital transformation of education by the State Scientific Institution 'Institute of Educational Analytics' (n.d.) reveal that the country is implementing electronic registers, online platforms, distance courses, and blended learning, while also providing pupils and students with access to educational materials through state digital services. It is also noted that teachers are

undertaking professional development in digital literacy, contributing to effective pedagogical communication in the online environment (Koshevets, 2026). Digital education in Ukraine is developing into a resilient educational ecosystem that includes LMS platforms, adaptive technologies, and networked educational resources. In times of crisis, particularly during war, digital tools have become essential for ensuring the continuity of learning and facilitating interaction between lecturers and students.

In the digital educational environment, the relationship between lecturer and student is characterised by continuous interaction, combining the transfer of knowledge, its joint construction, and the reciprocal exchange of information. The lecturer organises the learning process, moderates communication and provides methodological support, while the student is an active participant who receives educational material and participates in its discussion, interpretation and practical application (Xia *et al.*, 2023). This interaction is facilitated through various digital channels, ensuring both synchronous and asynchronous information exchange. This enables prompt responses to learning requests, correction of errors, and maintenance of the continuity of the educational process. Consequently, a dynamic system of pedagogical communication emerges, wherein both parties are equal participants in a learning process aimed at achieving educational outcomes and fostering the student's learning autonomy. Table 1 examines the respective roles of lecturers and students in the digital environment.

Table 1. The role of the lecturer and the student in the digital environment

Role of the lecturer	Role of the student
Organiser of the educational process, who structures educational content and determines the logic of the course	Active participant in the learning process, who completes assignments and takes part in interaction
Facilitator, who guides learning activity and supports cognitive engagement	Researcher, who independently works through the material and searches for additional sources of information
Moderator of communication, who regulates discussions and ensures learning interaction	Co-creator of knowledge, who participates in group discussions and collaborative projects
Consultant, who provides explanations, recommendations and individual feedback	Independent subject of learning, who plans their own educational trajectory
Assessor of learning outcomes, who monitors and conducts final assessment	Performer and reflective participant, who analyses their own results and improves learning actions

Source: compiled by the authors based on Woolap (2024), Vertex University (2026)

Chats facilitate rapid information exchange, clarification of learning tasks, and coordination of collaborative student activity. They provide a constant channel for brief communications. Forum discussions aim to facilitate in-depth analytical interaction, encouraging argumentation, the exchange of opinions, and reflection on educational material. Video communication enables direct contact between participants in the educational process, facilitating explanations of complex topics, demonstrations and discussions of completed assignments. Interactive collaborative tools support the collective creation of educational products, the structuring of information, and the visualisation of educational material, thereby activating students' cognitive activity. In the digital environment, feedback is

implemented as a multi-level system of interaction, including assessment by the lecturer, peer review among students, and self-monitoring of learning outcomes. This organisation ensures the continuity of correction in learning activities and improves the quality of material acquisition (Maier & Klotz, 2022). Group learning activities are based on role distribution, joint project completion and collective decision-making, which fosters cooperation and responsibility for shared outcomes. Individual work involves independent engagement with material, the choice of learning pace, and the formation of a personal learning trajectory according to one's needs. Digital educational communication combines various interaction formats, creating flexible learning conditions, increasing student engagement

and expanding the educational environment's possibilities. In such a system, learning acquires a multidimensional character, combining individual, group and networked forms of interaction, which contributes to the development of learning autonomy, communication skills and the ability to work in a digital environment.

In a digital society, models of educational communication organise interaction between lecturers and students, determining the methods by which knowledge is transferred, acquired and exchanged during the educational process. They facilitate the structuring of learning activities, the regulation of student engagement levels and the formation of effective feedback mechanisms. Consequently, learning becomes more manageable, consistent, and adapted to the conditions of the digital environment,

in which online platforms, interactive resources, and remote working play an important role (Al Salameh & Abdelaziz, 2025). Such approaches also improve the quality of educational interaction by contributing to the development of student autonomy, activating group collaboration and expanding access to global sources of knowledge. They enable the combination of individual learning and collective activity, creating conditions for a more flexible educational process. Consequently, a new type of pedagogical interaction emerges, centred on constant information exchange, the development of digital competencies, and the enhancement of learning effectiveness in the context of the digital transformation of education. Table 2 presents a comparative analysis of models of educational communication in the digital environment.

Table 2. Comparative analysis of models of educational communication according to interaction criteria

Criterion	Teacher-centred communication model	Student-centred communication model	Collaborative learning model	Connectivist communication model
Level of interactivity	The lecturer delivers a lecture via Zoom/Microsoft Teams; students listen and answer questions only at the end of the session	The student works with interactive tasks (Kahoot, Quizizz) and asks questions in the chat during learning	Students interact with one another in groups via Microsoft Teams and discuss tasks in chats and video meetings	Students interact through online communities (forums, YouTube comments, MOOCs); communication takes place beyond the lesson
Effectiveness of feedback	The lecturer checks work in Moodle/Google Classroom and assigns grades with comments after completion	The lecturer provides individual comments in Google Classroom, responds in the chat or conducts brief consultations	Feedback takes place between students through peer review in Google Docs and discussion of group results	Feedback is obtained through online communities, forums and comments on educational platforms
Degree of student autonomy	The student completes assignments according to the lecturer's instructions and does not change the structure of learning	The student independently chooses the order of completing tasks in Google Classroom and the pace of learning	The student independently performs a role in the group and makes decisions within the project	The student independently forms a learning pathway through Coursera, YouTube, blogs and forums
Opportunities for organising collaborative work	Collaborative work is almost absent; individual assignments are completed through Moodle	Discussions in chats and joint discussions in Padlet or forums	The main form of learning is group projects in Google Docs, Microsoft Teams and Trello	Collaboration takes place in global online communities and open educational networks
Use of digital tools	Zoom, Moodle, PowerPoint, electronic tests	Google Classroom, Kahoot, Quizizz, Padlet	Microsoft Teams, Google Docs, Miro, Trello	Coursera, edX, YouTube, blogs, forums, Discord

Note: MOOCs – Massive Open Online Courses

Source: compiled by the authors based on Zoom (n.d.), Microsoft Teams (n.d.), Moodle (n.d.), Google Classroom (n.d.), Kahoot (n.d.), Quizizz (n.d.), Padlet (n.d.), Google Docs (n.d.), Trello (n.d.), Miro (n.d.), Coursera (n.d.), edX (n.d.), YouTube (n.d.), Discord (n.d.), Z.N. Ghafar (2023), Europass Teacher Academy (2024), Education Endowment Foundation (n.d.), K. Pace (2026)

The advantages of digital communication formats in education primarily consist of increasing flexibility, interactivity and accessibility, since interaction between lecturers and students can take place in both synchronous and asynchronous modes, without being restricted to the classroom. This enables students to independently regulate the pace at which they absorb material, revisit educational content at a convenient time, and combine learning with other activities. This is particularly important in the context of digital society (Haleem *et al.*, 2022). Another advantage is improved feedback quality, as digital tools allow lecturers

to mark assignments quickly, provide comments and correct students' work almost in real time. This contributes to more effective knowledge acquisition, as students immediately receive information about errors and have the opportunity to correct them without delay. Additionally, digital formats offer greater potential for personalised learning, fostering student autonomy, teamwork skills, and a culture of digital communication – all of which are essential competencies in the modern educational landscape.

A comparative analysis of educational communication models shows that teacher-centred models have low

interactivity, limited feedback and minimal student autonomy, but ensure structured learning. The student-centred model increases engagement and the customisation of learning while expanding autonomy and improving feedback quality. The collaborative learning model is the most effective for developing teamwork skills, communication, and the practical application of knowledge, thanks to its high level of interactivity and active peer-to-peer exchange. The connectivist model offers students maximum autonomy and extensive opportunities for networked interaction. However, it requires a high level of self-regulation, making it most effective in digital environments for motivated learners.

The effectiveness of digital educational platforms within the online education system is determined by their ability to organise, manage and support the entire learning process within a unified digital environment. Such platforms combine synchronous and asynchronous interaction, enabling direct, real-time communication between lecturers and students, as well as delayed interaction through assignments, materials, and discussions. This allows for flexible organisation of learning, enabling students to work through material at their own pace while allowing lecturers to structure the course, monitor activity, and ensure

continuity of the educational process, regardless of participants' physical presence. Particular importance is attached to functions such as feedback, assessment and the organisation of collaborative activity, which facilitate effective pedagogical interaction in the digital environment. Platforms enable automated, personalised assessment of learning achievements, provide feedback on completed assignments and dynamically monitor students' progress. Another important feature is support for group work, implemented through collaborative projects, discussions, and the coordination of learning activities. Additionally, digital platforms integrate multimedia content, expanding the possibilities for presenting educational material and increasing the level of assimilation. Taken together, these features form a multifunctional educational environment that facilitates effective communication between lecturers and students, thereby improving the quality of online education. Table 3 presents the results of a systems analysis of the functional capabilities of digital educational platforms within the online education system. The analysis focuses particularly on ensuring synchronous and asynchronous communication, organising group work, providing feedback and assessments, and integrating multimedia content into the educational process.

Table 3. Functional capabilities of digital educational platforms in the system of online education

Digital platform	Synchronous communication	Asynchronous communication	Group work	Feedback and assessment	Integration of multimedia content
Moodle	Support for online meetings through integrated modules	Forum discussions, placement of materials and assignments	Group courses, collaborative assignments	Tests, automated assessment, lecturer's comments	Videos, presentations, documents, interactive elements
Google Classroom	Limited synchronous interaction through integrations	Assignments, announcements, comments	Collaborative projects through assignments	Comments, assessment rubrics, rapid feedback	Documents, presentations, video materials
Microsoft Teams	Video classes, real-time chat	Chats, channels, storage of materials	Team spaces, projects	Discussions, comments, assessment of assignments	Videos, presentations, shared files
Zoom	Main tool for videoconferencing	Recording of classes for later viewing	Use in group discussions	Oral feedback during classes	Screen sharing, presentations
Canvas	Integrated video and synchronous sessions	Assignments, modules, messages	Group spaces for learning	Learning analytics, assessment, comments	Videos, interactive modules, files

Source: compiled by the authors based on Moodle (n.d.), Google Classroom (n.d.), Microsoft Teams (n.d.), Zoom (n.d.), Canvas (n.d.)

Digital educational platforms provide comprehensive support for pedagogical interaction by integrating synchronous and asynchronous communication channels. This makes it possible to organise the learning process in various formats. Synchronous tools facilitate direct, real-time interaction between lecturers and students, and can be used to deliver explanations of educational material, conduct consultations, discuss complex issues, and provide immediate feedback. Asynchronous capabilities, in turn, enable independent engagement with material, the completion of assignments at a convenient pace, and participation in forum discussions. This contributes to deeper knowledge acquisition and the development of students' learning autonomy. Digital platforms are distinguished by their ability to support group learning

activities, such as collaborative projects, team assignments and collective discussion of results. This fosters the development of communication and teamwork skills, as well as the ability to make joint decisions. Digital assessment and feedback functions should also be noted, as they enable lecturers to promptly monitor students' learning achievements, provide comments and adjust the learning trajectory. Taken together, these capabilities ensure effective pedagogical interaction, improve communication quality between educational process participants and contribute to learning individualisation in the digital environment (Shyshenko, 2022). The comparative analysis shows that, for full-scale courses involving systematic assessment and asynchronous learning, Moodle and Canvas are the most effective; Microsoft Teams is optimal for blended

learning and team interaction; Google Classroom is suitable for rapidly organising the learning process and providing basic feedback; and Zoom is ideal for synchronous classes and online lectures. Overall, these results suggest that the most effective approach is to combine platforms depending on the educational scenario.

Digital educational communication formats are classified according to the type of interaction, the method of organising the learning process, and the functional purpose of the teaching tools. Within synchronous communication,

videoconferencing plays a key role as it enables direct, real-time interaction between lecturers and students. It can be used for lectures, seminars, project defence and consultations, enabling material to be explained, complex issues to be clarified and understanding of the topic to be checked promptly. The pedagogical function of this format lies in providing immediate feedback, monitoring learning activity, and maintaining learning discipline in a distance learning environment (Sultonovna, 2025). Table 4 presents the classification of digital educational communication formats.

Table 4. Classification of formats of digital educational communication

Format of digital communication	Type of interaction	Pedagogical functions	Features of use in the educational process
Videoconferencing	Synchronous, real-time	Explanation of new material, organisation of lectures and seminars, immediate feedback, monitoring of learning activity	Used for online lectures, consultations and project defence; ensures direct interaction between lecturer and students
Chats	Asynchronous/ semi-synchronous	Prompt communication, clarification of assignments, coordination of learning activity	Used for quick responses, organisational messages and support for group interaction outside classes
Forums	Asynchronous	Development of analytical thinking, argumentation, discussion, reflection	Allow extended responses, repeated review of discussions and in-depth engagement with educational material
Interactive whiteboards	Synchronous/ asynchronous	Visualisation of knowledge, collaborative construction of information, development of critical thinking	Used to create diagrams, mind maps, collective work on assignments and structuring of educational material
LMSs	Integrated, synchronous and asynchronous	Organisation of the learning process, assessment, progress monitoring, course management	Ensure the centralisation of educational materials, assignments, testing and communication between participants in the educational process

Source: compiled by the authors based on Y. Skiba (2025)

Asynchronous communication is facilitated via forums and chat rooms, enabling students to interact outside of class time. Chats are used to quickly answer organisational questions, clarify assignments and coordinate group work. They ensure a continuous channel of communication and support learning interaction outside of classroom time. Forum discussions encourage deeper engagement with educational topics, the articulation of arguments and analytical thinking, as students can formulate extended responses, analyse the views of other participants and revisit discussions at any time. Interactive whiteboards are used to visualise educational material and create content collaboratively. They enable lecturers to demonstrate diagrams, concept maps and algorithms for solving tasks, while students can contribute their own ideas, add comments and organise information (Hanna, 2024). Interactive whiteboards facilitate visual and activity-based learning, critical thinking, and the collective construction of knowledge when educational material is created through interaction. Learning Management Systems integrate all formats of digital communication into a single educational platform. Within these systems, educational materials are stored, assignments are organised, testing and assessment are carried out and student learning activity is monitored (Al-Dhief *et al.*, 2024). Their pedagogical function is to manage the learning process, ensure the structured nature of

educational content, and record learning outcomes. LMSs also support the individualisation of learning by adapting assignments and monitoring each student's progress. This allows lecturers to adjust the educational trajectory according to students' levels of preparedness. It has been shown that digital communication formats perform inter-related pedagogical functions: synchronous tools ensure immediate interaction and learning control, asynchronous tools support in-depth engagement with content and the development of autonomy, interactive whiteboards support collaborative knowledge construction, and LMSs ensure the systematic organisation of the entire educational process. Together, they form a multi-level model of educational communication in which learning takes place through constant interaction, information exchange, and collaborative activity between lecturers and students within a digital environment.

DISCUSSION

In the digital society, educational communication has undergone a structural transformation in the way lecturers and students interact. This interaction has become hybridised through digital platforms, social networks, mobile applications and artificial intelligence tools. The effectiveness of this interaction is determined by the digital competence of the participants and the level of digital infrastructure

at the educational institution. This transformation increases the accessibility of educational resources, expands opportunities for personalised learning and establishes new models of pedagogical interaction in the context of educational digitalisation. The facts identified regarding educational communications corresponded with the conclusions of M. Alenezi *et al.* (2023), who demonstrated that integrating digital education into higher education involves restructuring methods of interaction and requires lecturers to adapt to digital environments. The authors emphasised the existence of organisational and technical barriers, a finding that was confirmed by the results concerning the influence of infrastructural conditions on communication. The obtained data were corroborated by A. Almusaed *et al.* (2023) study, which found that using artificial intelligence in hybrid learning increases student engagement and alters the nature of educational interaction. This study emphasised AI's role as a mediator of communication, corresponding with the identified trend of automating some learning processes. The observed results coincided with the conclusions of B. Cabellos *et al.* (2024). It was demonstrated that lecturers' digital attitudes and the conditions of the educational environment determine the intensity of ICT use and the development of students' digital skills. The interpretation indicates a dependence on pedagogical readiness for digital change. The research results showed that digital educational communications are more effective when synchronous and asynchronous learning formats are combined. This is evidenced by the 78% level of student engagement in LMSs and the increase in the proportion of EU online learning users from 21.4% to 34.8%. The patterns identified regarding lecturers' readiness for digital change were consistent with the findings of J. Castaño Muñoz *et al.* (2021), who demonstrated that collaboration among lecturers fosters students' digital competence development. It was also found that institutional self-assessment tools support the development of the digital environment, which is consistent with the conclusions regarding the role of collective pedagogical interaction. This is consistent with the findings of C. Chang *et al.* (2023), who considered digital literacy to be a key factor in the effective use of AR, VR, and MR technologies for learning purposes. This enabled this study to conclude that multimedia technologies significantly alter the structure of educational communication.

The results of the study were consistent with the conclusions of M. de Obeso *et al.* (2023), who found that students' perception of lecturers' digital competence influences the level of trust and interaction. The importance of lecturers' digital authority in facilitating effective communication was confirmed. The obtained data were consistent with the results of V. Díaz-García *et al.* (2023) in direction. The digital transformation of educational institutions was considered a complex managerial process influencing the introduction of new learning interactions. It was found that organisational support determines the pace of digital communication. Observed trends corresponded with the findings of W. Jeong *et al.* (2024), who found that the digital capital of participants

in the educational process affects academic achievement. This allows inequality in access to digital resources to be viewed as a factor in the asymmetry of educational communication. This asymmetry manifests as differences in engagement with digital platforms, access to educational materials, and interaction opportunities between participants in the educational process. This coincided with the conclusions of A. Josué *et al.* (2023), who regard digital platforms as a key tool for organising the learning process. Educational technologies increase student engagement by providing interactive learning mechanisms. This is evident in students' increased activity when completing assignments and their enhanced participation in the communicative processes of the learning environment. The identified patterns were consistent with the results of J. Kim (2023), who considered interaction between lecturers and artificial intelligence to be a new form of pedagogical cooperation. Integrating artificial intelligence into the educational process changes the roles of participants and the nature of their communication. It also contributes to the emergence of new formats that support learning activities and automate certain pedagogical functions. These new formats include intelligent tutoring, personalised learning recommendations, adaptive assessment, automated feedback, virtual assistants, chatbots for student consultations, systems for predicting learning outcomes, and tools for automatically generating educational content. The automation of pedagogical functions includes checking assignments, monitoring learning activities, analysing students' progress, and preparing personalised learning plans.

AI has transformed the role of lecturers by changing communicative functions and reorienting pedagogical activity towards interaction with digital systems. These results are consistent with the conclusions of S. Mhlongo *et al.* (2023), who found that barriers to implementing digital technologies include insufficient resources and low digital skills, which limit the full integration of innovative tools into the learning process. This results in uneven development of digital educational practices across different institutions. The obtained data corresponded to the results of S. Muammar *et al.* (2022). The quality of the learning process is determined by lecturers' digital competence. This confirms the importance of pedagogical digital training for effective communication. The results were also consistent with the conclusions of A. Ou *et al.* (2024), who considered artificial intelligence to be a factor that alters the nature of academic discourse and the organisation of educational interaction in higher education. Communication processes become mixed, combining human and technological participation in the transmission and processing of educational content. This is consistent with V. Ratten (2023) study, which described the transition to digital teaching methods following the pandemic. This made it possible to explain the dominance of digital interaction formats. The identified trends corresponded to the conclusions of A. Purwanto *et al.* (2023), who considered social networks to be a tool for educational communication. This confirmed the expansion of channels of interaction between

lecturers and students. The results obtained coincided with Y. Shi (2023) data, which considered mobile platforms to be an effective learning tool. It was established that the portability of technology strengthens communication continuity. Interactive synchronous platforms were found to be the most effective, providing immediate feedback and explanations of complex educational material. Asynchronous environments, meanwhile, contributed to students' development of independence. Combining individual and group work formats in digital environments improved the quality of knowledge acquisition and expanded the possibilities for collaborative learning. The obtained data correlated with the results of Z. Wang & Z. Chu (2023), which found that lecturers' self-assessment of digital competence influences the effectiveness of the educational process. Additionally, the authors emphasised that developing teachers' digital skills increases student engagement and improves the quality of learning interactions. Y. Xie *et al.* (2022) found that structured interaction scenarios are required for online communication to improve learning effectiveness. The researchers noted in particular that organised communication protocols reduce students' cognitive load and contribute to better assimilation of educational material. They also established that planning the stages of interaction between participants in the educational process increases engagement, improves feedback quality, and facilitates the more effective completion of individual and group tasks in a digital environment. Overall, the study's findings indicated a transformation in educational communication under the influence of digital technologies, particularly artificial intelligence and mobile platforms. It was established that the effectiveness of the learning process depends to a significant extent on the level of lecturers' digital competence, the quality of the organisation of online interaction and the structured nature of communication scenarios. The obtained results confirmed that the digitalisation of educational communications contributes to increasing the effectiveness of the learning process, expanding opportunities for interaction between its participants and developing students' learning autonomy. The combination of digital platforms, pedagogical approaches and artificial intelligence technologies forms a flexible educational environment capable of adapting to the needs of education.

CONCLUSIONS

In the digital society, educational communications function as an integrated system of interaction between lecturers and students. Combining digital platforms and synchronous and asynchronous learning forms, they contribute to the development of learning autonomy, cooperation and digital competence, as well as improving the effectiveness of the educational process. Student-centred, collaborative and connectivist approaches ensure active student participation in knowledge creation, expand feedback possibilities and form a flexible, adaptive learning environment. Generalisation of the results shows that digital educational communications are highly effective when combining

synchronous and asynchronous formats. At the same time, 78% of students are engaged with LMSs, and the share of online learning users in the EU has increased from 21.4% to 34.8%, confirming a stable trend in the digital transformation of education. The most productive formats are interactive, synchronous platforms for explaining complex material and providing immediate feedback. Asynchronous environments, on the other hand, ensure deeper engagement with content and increase learning autonomy. Combining group and individual work formats on digital platforms expands opportunities for cooperation and improves the quality of knowledge acquisition. This is confirmed by the steady growth of digital activity among students and lecturers.

Platforms enable automated and individual assessment of learning achievements, provide feedback on completed assignments and dynamically monitor students' progress, thereby increasing the accuracy and promptness of pedagogical control and correction in learning activities. An important feature is the support for group work, implemented through collaborative projects, discussions, and the coordination of learning activities. This ensures the development of communication and teamwork skills. Additionally, digital platforms integrate multimedia content, expanding the possibilities for presenting educational material and increasing the level of assimilation through visualisation and interactivity. Taken together, these features create a multifunctional educational environment that facilitates effective communication between lecturers and students, thereby improving the quality of online education, as evidenced by the results of systems analysis of digital educational platforms in pedagogical practice.

Digital educational communication can be classified into three formats: synchronous, asynchronous, and integrated tools of interaction. These formats perform different pedagogical functions in the educational process. Video-conferencing enables direct contact between lecturers and students, providing immediate feedback. Chats and forums facilitate rapid communication and in-depth discussion of educational topics, while interactive whiteboards support the collaborative creation and visualisation of knowledge. Learning Management Systems combine all these formats to organise the learning process and assess and monitor students' progress. This increases the effectiveness of pedagogical interaction in the digital environment. Further research could focus on the effectiveness of specific digital platforms in different educational contexts, particularly in face-to-face, blended and distance learning settings, and in institutions offering general, higher and postgraduate education.

ACKNOWLEDGEMENTS

None.

FUNDING

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Al Salaimeh, S., & Abdelaziz, G. (2025). Models of educational communication in the e-learning system of the university. *Sociedad & Tecnología*, 8(1), 122-137. doi: 10.51247/st.v8i1.456.
- [2] Al-Dhief, F.T., Al Nasser, A., Tharikh, S.M., Al Nasser, H., Almuslih, A., Albadr, M., & Mohamed, M.R. (2024). Review of learning management systems: History, types, advantages, and challenges. *Indonesian Journal of Electrical Engineering and Computer Science*, 33(1), 350-360. doi: 10.11591/ijeecs.v33.i1.pp350-360.
- [3] Alenezi, M., Wardat, S., & Akour, M. (2023). The need of integrating digital education in higher education: Challenges and opportunities. *Sustainability*, 15(6), article number 4782. doi: 10.3390/su15064782.
- [4] Almusaed, A., Almssad, A., Yitmen, I., & Homod, R.Z. (2023). Enhancing student engagement: Harnessing "AIED"'s power in hybrid education – a review analysis. *Education sciences*, 13(7), article number 632. doi: 10.3390/educsci13070632.
- [5] Cabellos, B., Siddiq, F., & Scherer, R. (2024). The moderating role of school facilitating conditions and attitudes towards ICT on teachers' ICT use and emphasis on developing students' digital skills. *Computers in Human Behavior*, 150, article number 107994. doi: 10.1016/j.chb.2023.107994.
- [6] Castaño Muñoz, J., Vuorikari, R., Costa, P., Hippe, R., & Kamyliis, P. (2021). Teacher collaboration and students' digital competence-evidence from the SELFIE tool. *European Journal of Teacher Education*, 46(3), 476-497. doi: 10.1080/02619768.2021.1938535.
- [7] Chang, C.Y., Kuo, H.C., & Du, Z. (2023). The role of digital literacy in augmented, virtual, and mixed reality in popular science education: A review study and an educational framework development. *Virtual Reality*, 27(3), 2461-2479. doi: 10.1007/s10055-023-00817-9.
- [8] Coursera. (n.d.). Retrieved from <https://www.coursera.org>.
- [9] Cramarenco, R.E., Burcă-Voicu, M.I., & Dabija, D.C. (2023). Student perceptions of online education and digital technologies during the COVID-19 pandemic: A systematic review. *Electronics*, 12(2), article number 319. doi: 10.3390/electronics12020319.
- [10] de Obesso, M.D.L.M., Núñez-Canal, M., & Pérez-Rivero, C.A. (2023). How do students perceive educators' digital competence in higher education?. *Technological Forecasting and Social Change*, 188, article number 122284. doi: 10.1016/j.techfore.2022.122284.
- [11] Díaz-García, V., Montero-Navarro, A., Rodríguez-Sánchez, J.L., & Gallego-Losada, R. (2023). Managing digital transformation: A case study in a higher education institution. *Electronics*, 12(11), article number 2522. doi: 10.3390/electronics12112522.
- [12] Discord. (n.d.). Retrieved from <https://discord.com>.
- [13] Education Endowment Foundation. (n.d.). *Collaborative learning approaches*. Retrieved from <https://educationendowmentfoundation.org.uk/education-evidence/teaching-learning-toolkit/collaborative-learning-approaches/>.
- [14] edX (n.d.). Retrieved from <https://www.edx.org>.
- [15] Epitech. (n.d.). *Communication skills*. Retrieved from <https://www.epitech-it.es/en/communication-skills/>.
- [16] Europass Teacher Academy. (2024). *Student-centered learning: The ultimate guidebook*. Retrieved from <https://www.teacheracademy.eu/blog/student-centered-learning/>.
- [17] European Commission. (2026). *Online learning increasingly popular across the EU*. Retrieved from <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/edn-20260319-1>.
- [18] Ghafar, Z.N. (2023). The teacher-centered and the student-centered: A comparison of two approaches. *International Journal of Arts and Humanities*, 1(1), 18-23. doi: 10.61424/ijah.v1i1.7.
- [19] Google Classroom. (n.d.). Retrieved from <https://classroom.google.com>.
- [20] Google Docs. (n.d.). Retrieved from <https://docs.google.com>.
- [21] Haleem, A., Javaid, M., Qadri, M.A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, 3, 275-285. doi: 10.1016/j.susoc.2022.05.004.
- [22] Hanna, K.T. (2024). *Interactive whiteboard*. Retrieved from <https://surl.li/wfuniu>.
- [23] Jeong, D.W., Moon, H., Jeong, S.M., & Moon, C.J. (2024). Digital capital accumulation in schools, teachers, and students and academic achievement: Cross-country evidence from the PISA 2018. *International Journal of Educational Development*, 107, article number 103024. doi: 10.1016/j.ijedudev.2024.103024.
- [24] Josué, A., Bedoya-Flores, M.C., Mosquera-Quinonez, E.F., Mesías-Simisterra, Á.E., & Bautista-Sánchez, J.V. (2023). Educational platforms: Digital tools for the teaching-learning process in education. *Ibero-American Journal of Education & Society Research*, 3(1), 259-263. doi: 10.56183/iberoeds.v3i1.626.
- [25] Kahoot. (n.d.). Retrieved from <https://kahoot.com>.
- [26] Kim, J. (2023). Leading teachers' perspective on teacher-AI collaboration in education. *Education and Information Technologies*, 29(7), 8693-8724. doi: 10.1007/s10639-023-12109-5.

- [27] Koshevets, O. (2026). A case study of the your educational path digital education ecosystem in crisis contexts: AI, mental health, and equity in Ukraine. *The International Review of Research in Open and Distributed Learning*, 27(2), 1-20. [doi: 10.19173/irrodl.v27i2.9115](https://doi.org/10.19173/irrodl.v27i2.9115).
- [28] Laskar, M.H. (2023). Examining the emergence of digital society and the digital divide in India: A comparative evaluation between urban and rural areas. *Frontiers in Sociology*, 8, article number 1145221. [doi: 10.3389/fsoc.2023.1145221](https://doi.org/10.3389/fsoc.2023.1145221).
- [29] Lazareva, A., Zadorina, O., Rizak, G., & Kaminsky, V. (2024). Adapting curricula to the needs of the modern digital society in Ukraine. *Futurity Education*, 4(3), 236-252. [doi: 10.57125/FED.2024.09.25.14](https://doi.org/10.57125/FED.2024.09.25.14).
- [30] Maier, U., & Klotz, C. (2022). Personalized feedback in digital learning environments: Classification framework and literature review. *Computers and Education: Artificial Intelligence*, 3, article number 100080. [doi: 10.1016/j.caeai.2022.100080](https://doi.org/10.1016/j.caeai.2022.100080).
- [31] Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Heliyon*, 9(6), article number e16348. [doi: 10.1016/j.heliyon.2023.e16348](https://doi.org/10.1016/j.heliyon.2023.e16348).
- [32] Mialkovska, L., Redchuk, R., Sushyk, I., Martyniuk, Y., Maiboroda, O., & Savchuk, N. (2023). Social management and digital communications as important components of modern higher education. *Brazilian Journal of Education, Technology and Society*, 16(1), 143-152. [doi: 10.14571/brajets.v16.n1.143-152](https://doi.org/10.14571/brajets.v16.n1.143-152).
- [33] Microsoft Teams. (n.d.). Retrieved from <https://www.microsoft.com/microsoft-teams>.
- [34] Ministry of Digital Transformation of Ukraine. (2025). 42% of adults and 70% of teens in Ukraine use AI: Results of the Diia.Education study. Retrieved from <https://surl.li/dshytl>.
- [35] Miro. (n.d.). Retrieved from <https://miro.com>.
- [36] Moodle. (n.d.). Retrieved from <https://moodle.org>.
- [37] Muammar, S., Hashim, K.F.B., & Panthakkan, A. (2022). Evaluation of digital competence level among educators in UAE higher education institutions using digital competence of educators (DigComEdu) framework. *Education and Information Technologies*, 28(3), 2485-2508. [doi: 10.1007/s10639-022-11296-x](https://doi.org/10.1007/s10639-022-11296-x).
- [38] Nychkalo, N., Muranova, N., Voliarska, O.S., & Matulcikova, M. (2024). [Integration of Ukrainian children and youth using digital tools in the educational environment of Slovakia](https://doi.org/10.1007/978-94-007-9888-8_1). *Information Technologies and Learning Tools*, 3(101), 150-163.
- [39] Ohara, M.R. (2023). The role of social media in educational communication management. *Journal of Contemporary Administration and Management*, 1(2), 70-76. [doi: 10.61100/adman.v1i2.25](https://doi.org/10.61100/adman.v1i2.25).
- [40] Ou, A.W., Stöhr, C., & Malmström, H. (2024). Academic communication with AI-powered language tools in higher education: From a post-humanist perspective. *System*, 121, article number 103225. [doi: 10.1016/j.system.2024.103225](https://doi.org/10.1016/j.system.2024.103225).
- [41] Pace, K. (2026). *Connectivism learning theory: A guide for educators*. Retrieved from <https://www.wgu.edu/blog/connectivism-learning-theory2105.html>.
- [42] Padlet. (n.d.). Retrieved from <https://padlet.com>.
- [43] Purwanto, A., Fahmi, K., & Cahyono, Y. (2023). The benefits of using social media in the learning process of students in the digital literacy era and the education 4.0 era. *Journal of Information Systems and Management*, 2(2), 1-7. [doi: 10.4444/jisma.v2i2.296](https://doi.org/10.4444/jisma.v2i2.296).
- [44] Quizizz. (n.d.). Retrieved from <https://quizizz.com>.
- [45] Ratten, V. (2023). The post COVID-19 pandemic era: Changes in teaching and learning methods for management educators. *The International Journal of Management Education*, 21(2), article number 100777. [doi: 10.1016/j.ijme.2023.100777](https://doi.org/10.1016/j.ijme.2023.100777).
- [46] Salarvand, S., Mousavi, M.S., & Rahimi, M. (2023). Communication and cooperation challenges in the online classroom in the COVID-19 era: A qualitative study. *BMC Medical Education*, 23(1), article number 201. [doi: 10.1186/s12909-023-04189-1](https://doi.org/10.1186/s12909-023-04189-1).
- [47] Shi, Y. (2023). The use of mobile internet platforms and applications in vocal training: Synergy of technological and pedagogical solutions. *Interactive Learning Environments*, 31(6), 3780-3791. [doi: 10.1080/10494820.2021.1943456](https://doi.org/10.1080/10494820.2021.1943456).
- [48] Shyshenko, I. (2022). Some aspects of the influence of digital technologies on the educational process in higher education institutions: An overview of problems and challenges. *Education Innovation Practice*, 10(5), 42-47. [doi: 10.31110/2616-650X-vol10i5-006](https://doi.org/10.31110/2616-650X-vol10i5-006).
- [49] Skiba, Y. (2025). Classification of digital tools to support the educational process in higher education. *Continuing Professional Education Theory and Practice*, 84(3), article number 150. [doi: 10.28925/2412-0774.2025.3.12](https://doi.org/10.28925/2412-0774.2025.3.12).
- [50] State Scientific Institution "Institute of Educational Analytics". (n.d.). *Ukraine: Digital transformation of education as a strategic path to resilience and innovation*. Retrieved from <https://eurydice.iea.gov.ua/news/ukraine-digital-transformation-of-education-as-a-strategic-path-to-resilience-and-innovation/>.
- [51] Sultonovna, M.X. (2025). [Digital educational technology classification for usage in higher education institutions' instructional activities](https://doi.org/10.1007/978-94-007-9888-8_1). *British Journal of Global Ecology and Sustainable Development*, 36, 51-54.

- [52] Tondeur, J., Howard, S., Van Zanten, M., Gorissen, P., Van der Neut, I., Uerz, D., & Kral, M. (2023). The HeDiCom framework: Higher education teachers' digital competencies for the future. *Educational Technology Research and Development*, 71(1), 33-53. doi: 10.1007/s11423-023-10193-5.
- [53] Trello. (n.d.). Retrieved from <https://trello.com>.
- [54] Vega-Ramírez, J., Castro-Duarte, P., & Quintana-Figueroa, C. (2023). Communication of results of educational policies: Impact levels of educational policies in the digital society. *Societies*, 13(2), article number 34. doi: 10.3390/soc13020034.
- [55] Vertex University. (2026). *Standards that make learning from home more effective*. Retrieved from <https://vertexuniversity.edu.eu/en/articles/standards-that-make-learning-from-home-more-effective/>.
- [56] Wang, Z., & Chu, Z. (2023). Examination of higher education teachers' self-perception of digital competence, self-efficacy, and facilitating conditions: An empirical study in the context of China. *Sustainability*, 15(14), article number 10945. doi: 10.3390/su151410945.
- [57] Wooclap. (2024). *Are teachers still teachers in the digital age?* Retrieved from <https://www.wooclap.com/en/blog/are-teachers-still-teachers-in-the-digital-age/>.
- [58] Xia, Q., Zhou, X., Weng, X., & Chiu, T.K.F. (2023). Teacher support and student engagement in digital learning. In *The post-pandemic landscape of education and beyond: innovation and transformation* (pp. 134-147). Cham: Springer. doi: 10.1007/978-981-19-9217-9_9.
- [59] Xie, Y., Huang, Y., Luo, W., Bai, Y., Qiu, Y., & Ouyang, Z. (2022). Design and effects of the teacher-student interaction model in the online learning spaces. *Journal of Computing in Higher Education*, 35(1), 69-90. doi: 10.1007/s12528-022-09348-9.
- [60] Yemelyanova, O., Bakhmat, N., Huda, O., Shvets, T., & Boichuk, A. (2023). The educational crisis in today's information and digital society. *Revista Eduweb*, 17(2), 267-284. doi: 10.46502/issn.1856-7576/2023.17.02.23.
- [61] YouTube. (n.d.). Retrieved from <https://www.youtube.com>.
- [62] ZipDo. (2026). *LMS usage statistics 2026: Global learning management system trends*. Retrieved from <https://zipdo.co/lms-usage-statistics/>.
- [63] Zoom. (n.d.). Retrieved from <https://zoom.us/>.

Олена Дудар

Кандидат психологічних наук, доцент
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0000-0003-0541-5646>

Ярослав Щоголев

Старший викладач
Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
<https://orcid.org/0009-0007-7814-638>

Освітні комунікації в цифровому суспільстві: нові формати взаємодії між викладачем і студентом

Анотація. Метою дослідження було з'ясування впливу цифрових технологій на зміну характеру та організацію взаємодії між викладачем і студентом у сучасному освітньому процесі. Методологія дослідження включала теоретичний аналіз наукових джерел, метод порівняння, метод системного аналізу, метод систематизації та узагальнення. Було з'ясовано, що результати свідчать про стабільне зростання ефективності цифрових освітніх комунікацій, що підтверджується підвищенням рівня участі в онлайн-навчанні з 21,4 % до 34,8 % у Європейському Союзі та високою інтеграцією Learning Management System, якими регулярно користуються близько 78 % студентів. Було визначено, що синхронні формати забезпечують найвищу ефективність у ситуаціях пояснення складного матеріалу та оперативного зворотного зв'язку, тоді як асинхронні середовища та комбіновані платформи демонструють кращі результати у розвитку автономності студентів, глибокому опрацюванні навчального контенту та організації групової взаємодії. Студентоцентризований, колаборативний і конективістський підходи сприяють розвитку самостійності студентів і активізації їхньої взаємодії. Було визначено, що вони дозволяють поєднувати індивідуальне навчання з командною діяльністю та створюють умови для гнучкого освітнього процесу. Визначено, що цифрові платформи забезпечують автоматизоване та індивідуальне оцінювання навчальних досягнень студентів. Вони дають змогу надавати оперативний зворотний зв'язок і відстежувати прогрес у динаміці. Також вони підтримують організацію групової роботи через спільні проекти та обговорення. У сукупності це підвищує якість освітньої взаємодії. Виокремлено, що класифікація форматів цифрової освітньої комунікації охоплює синхронні та асинхронні інструменти взаємодії. Відеоконференції забезпечують безпосередній контакт між учасниками навчання та оперативний зворотний зв'язок. Результати дослідження можуть бути використані викладачами, адміністрацією закладів вищої освіти та розробниками освітніх програм для вдосконалення організації цифрової освітньої комунікації та підвищення ефективності взаємодії між викладачем і студентом

Ключові слова: поширення інформації; педагогічна функція; мультимедійний контент; форумні обговорення; передача знань

Журнал
«Scientia et Societus»

Том 5, № 1
2026

(Англійською мовою)

Відповідальний редактор:
Л. Товкун

Підписано до друку 12.05.2026 р.
Формат 60*84/8
Умовн. друк. арк. 13,5
Тираж 100 прим.

Видавництво: Університет Григорія Сковороди в Переяславі
08401, вул. Сухомлинського, 30, м. Переяслав, Україна
Тел.: +38 (044) 293-11-10
E-mail: mail@sets.com.ua
<https://sets.com.ua/>

Journal
“Scientia et Societus”

**Volume 5, No. 1
2026**

Managing Editor:
L. Tovkun

Signed for print 12.05.2026
Format 60*84/8
Conventional printed pages 13.5
Circulation 100 copies

Publisher: Hryhorii Skovoroda University in Pereiaslav
08401, 30 Sukhomlyns'koho Str., Pereiaslav, Ukraine
Tel.: +38 (044) 293-11-10
mail@sets.com.ua
<https://sets.com.ua/>