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PEDAGOGICAL INTERACTION IN HYBRID LEARNING: STUDENT EXPERIENCE, EXPECTATIONS, AND METHODOLOGICAL GUIDELINES

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Abstract. This article examines the pedagogical specificities of hybrid learning within Ukrainian higher education in the context of ongoing crisis conditions caused by the COVID-19 pandemic and military conflict. The study analyses how technological, organizational, and psychological factors shape pedagogical interaction in hybrid environments, drawing on contemporary theoretical frameworks and empirical data collected through a student survey. The results demonstrate that the effectiveness of hybrid learning depends on technological stability, clear communication, balanced participation of online and in-person students, and instructors' digital competence. While students reported numerous challenges–including technical instability and uneven instructor attention–they also identified significant advantages such as flexibility, accessibility, psychological comfort, and improved digital skills. Based on the findings, the article proposes methodological recommendations for enhancing pedagogical interaction and strengthening the resilience of hybrid learning models in modern higher education.

Key words: hybrid learning; pedagogical interaction; digital competence; higher education; crisis-responsive teaching; blended instruction; student engagement; instructional design.

Introduction. Contemporary higher education in Ukraine is marked by continuous transformation and the necessity to adapt rapidly to the complex conditions in which both instructors and students find themselves. Crisis situations require higher education institutions to revise and modernize educational approaches, taking into account labour market demands as well as the needs of educators and students who are compelled to function within challenging security environments while continuing their academic development. Such turning points often act as catalysts for the emergence of innovative and unconventional educational solutions. One such solution – enabling high-quality and resilient interaction between instructors and students under crisis conditions – is hybrid learning, or blended education, which ensures equitable access to the learning environment for all participants.

The aim of this study is to examine the specific features of pedagogical interaction within a hybrid learning format, identify student expectations, and determine methodological guidelines for enhancing instructional effectiveness. Accordingly, several research objectives were formulated:

– to analyse contemporary scholarly approaches to defining the essence of hybrid learning and its features in higher education;

– to determine the impact of global crisis factors (COVID-19, military conflicts) on the transformation of the educational process and the emergence of hybrid learning models;

– to outline the key characteristics of pedagogical interaction in a hybrid environment and identify factors that hinder or strengthen its effectiveness;

– to explore students' experiences, expectations, and perceived advantages and disadvantages of hybrid learning based on a targeted survey;

– to formulate methodological recommendations for improving pedagogical interaction within the hybrid format, grounded in theoretical analysis and empirical results.

Core section. The COVID-19 pandemic and the ongoing military conflicts have profoundly transformed higher education systems worldwide, reshaping not only modes of instruction but also institutional policies, pedagogical priorities, and student experiences. One of the most visible consequences of these disruptions has been the unprecedentedly rapid transition to remote and hybrid learning. Universities across the globe were compelled to migrate to online platforms within extremely short timeframes, which, as noted in a global survey by UNESCO (2021), accelerated the integration of digital learning environments to the point where hybrid and remote modalities became routine components of academic practice. This shift redefined the spatial and temporal boundaries of education, making flexibility a structural rather than optional element of university teaching.

Another critical consequence of these crises has been the emergence of substantial learning losses. Prolonged school closures, displacement, instability, and interruptions caused by military actions have severely affected students' ability to engage consistently in the learning process. According to UNICEF (2023), more than 5.3 million children and young adults in Ukraine alone have experienced disruptions that hindered their educational progress, highlighting the urgent need for compensatory programs, remedial courses, and institutional strategies aimed at restoring learning continuity.

The pedagogical landscape has also undergone considerable transformation. Educators were required to redesign their teaching approaches by combining synchronous and asynchronous forms of instruction, integrating project-based learning, and adopting more flexible and adaptive assessment tools suitable for digital environments. These shifts, described in UNESCO's report on student perspectives during the COVID-19 crisis (UNESCO, 2021), not only altered traditional methods of instruction but also demanded a comprehensive rethinking of course design, evaluation methods, and student engagement strategies.

In parallel, the crises exposed and intensified the need for strengthening teachers' digital competences. Instructors were expected to rapidly acquire technological fluency: mastering online platforms, facilitating virtual discussions, maintaining student engagement across physical and virtual settings, and navigating an array of digital tools. This need is thoroughly documented in the European Students' Union Digital Education Readiness Report (European Students' Union, 2022), which emphasizes that the success of hybrid learning is directly linked to educators' ability to adapt to evolving technological demands.

The psychological dimension of education has also gained heightened attention. Prolonged stress, social isolation, uncertainty, and the emotional burden associated with war have significantly increased the demand for mental health and psychosocial support among both students and academic staff. UNICEF (2022) highlights that crisis conditions amplify vulnerability, making structured psychological assistance essential for sustaining student well-being and academic functioning.

At the institutional level, universities have been compelled to adopt more flexible and resilient policies. Many higher education institutions began to implement emergency teaching plans, develop hybrid instructional models, and establish digital quality assurance mechanisms intended to safeguard the continuity and quality of education under unpredictable conditions. These developments are reflected in UNESCO's analysis of resilience-building processes in higher education (UNESCO, 2022).

Finally, the global nature of these crises has stimulated an expansion of international cooperation and donor support. Organizations such as UNESCO, UNICEF, and the World Bank have intensified funding initiatives, technological assistance, and training programs designed to sustain education in emergency contexts. The UNESCO & World Bank (2023) report underscores this multilevel global response as a crucial factor in stabilizing educational systems and enabling their long-term recovery. These changes stimulated the transformation of educational systems and reinforced the shift toward hybrid learning as a sustainable and flexible model.

Hybrid learning, as defined by Hamza-Lup and White (2018), is a combination of online and traditional instruction that provides a gradual transition towards technology-enabled education. Graham

(2013) describes hybrid (blended) learning as a system that "combines face-to-face instruction with computer-mediated instruction." According to Garrison and Vaughan (2008), it represents "a design approach whereby both face-to-face and online learning are made better by the presence of the other."

Based on these scholarly perspectives, and considering the model implemented in Ukrainian higher education institutions today, hybrid learning can be defined as an educational system that integrates student–teacher and student–student interaction through both face-to-face and online modalities, supported by modern information and communication technologies and personal learning systems that provide real-time audio-visual participation and access to learning materials, practical tasks, tests, and digital resources. Such a system enables the creation of an inclusive learning environment in which all participants receive equal access to educational content, directly influencing the quality of pedagogical interaction.

Pedagogical interaction itself is widely explored in educational scholarship due to its vital role in shaping conditions for personal development. According to the Ukrainian Electronic Educational Encyclopedia, pedagogical interaction is a process of active cooperation among participants in the educational process aimed at achieving shared learning goals and facilitating personal development.

A. Marchuk (2019) defines pedagogical interaction as collaboration among all subjects of the educational process that organizes the efforts of students and academic staff to foster value orientations, professional competence, and social experience necessary for life success.

In Becoming a Critically Reflective Teacher, Brookfield (2017) conceptualizes pedagogical interaction as a reflective dialogue grounded in four lenses – personal experience, student perspectives, collegial insights, and theoretical literature – which together enhance understanding and foster learner autonomy.

Drawing on these perspectives, pedagogical interaction can be defined as a purposeful socio-psychological process of joint activity between instructors and students, realized through communication, feedback, facilitation, and reflection. In hybrid learning, this interaction encompasses the organization of the learning space, management of tasks, and support for cognitive and personal development.

Hybrid learning combines face-to-face and online participation, creating a new multilayered model of pedagogical interaction. It requires instructors to simultaneously coordinate learning for both online and in-person groups, which significantly increases cognitive load. Instructors must deliver content, moderate discussions, maintain attention, troubleshoot technical issues, and ensure inclusivity.

As Garrison and Vaughan (2008) emphasize, interaction is the core condition for building a learning community, which is crucial for deep learning in hybrid environments.

The effectiveness of hybrid pedagogical interaction strongly depends on the technological infrastructure. Stable internet, high-quality audio and video, and access to digital platforms and LMS systems are essential (Hamza-Lup & White, 2018). Research by Vereshchahina, Liashchenko, and Babiy (2020) confirms that poor technological readiness and insufficient digital support significantly hinder interaction in hybrid courses.

Hybrid interaction demonstrates a number of significant advantages that collectively enhance the quality and inclusivity of the educational process. One of its core strengths lies in the integrated nature of communication, which enables the simultaneous involvement of students participating both in the physical classroom and online. This dual presence fosters a multidimensional learning environment where different modes of participation complement one another, enriching the collective learning experience. Furthermore, the hybrid model naturally supports a higher degree of personalization: students are able to choose the mode of engagement that best aligns with their individual circumstances, learning preferences, and psychological comfort. This flexibility contributes to improved academic accessibility, particularly for those who may face geographical, logistical, or health-related constraints that prevent consistent offline attendance. As a result, hybrid learning expands educational opportunities and supports a more adaptive, student-centred learning trajectory.

Despite these clear benefits, several challenges continue to impede fully effective pedagogical interaction within hybrid environments. Technical instability remains one of the most persistent obstacles, as fluctuations in internet connectivity, inadequate equipment, and software-related issues disrupt communication channels and fragment the learning flow. These technical barriers often exacerbate another problem – the uneven distribution of instructor attention between online and offline participants. When educators must simultaneously manage two learning spaces, it becomes difficult to maintain balance, which may result in online students feeling marginalized or less visible within the interactional dynamics of the class.

Organizational inconsistencies also contribute to the complexity of the hybrid format. Variability in scheduling, insufficient advance notice regarding changes, and the lack of unified procedural standards can create confusion and reduce the overall coherence of the learning process. Limited institutional resources, particularly outdated or insufficient classroom technology, further constrain the potential of hybrid formats, restricting both the quality of audio-visual communication and the possibilities for collaborative engagement. Finally, differing levels of digital competence among participants – including both students and instructors – can hinder effective communication, reduce confidence in the use of online tools, and ultimately diminish student engagement, especially among those attending remotely.

Taken together, these challenges highlight the necessity of comprehensive support systems and strategic improvements to ensure the stability, inclusiveness, and pedagogical effectiveness of hybrid learning environments.

Thus, hybrid pedagogical interaction is a complex, multifaceted process shaped by technological, organizational, communication, and psychological factors.

To understand students' experiences with hybrid learning and identify its perceived strengths, challenges, and expectations, a survey titled "Experience of Learning in a Hybrid Format" was developed and distributed among students who regularly participate in hybrid classes.

The questionnaire consisted of 12 items, including both closed (quantitative) and open-ended (qualitative) questions. It comprised three thematic blocks:

1. **Evaluation of hybrid learning organization**. This section of the questionnaire included both scale-based and multiple-choice items aimed at identifying the overall level of student satisfaction with the organization of hybrid classes, the availability and quality of technical support, the accessibility of the instructor, and the effectiveness of communication among participants. Students evaluated the quality of the hybrid format in terms of its convenience, the clarity and coherence of the lesson structure, as well as the degree of engagement demonstrated by both online and offline participants. In this way, the block made it possible to measure how well the hybrid model supports coordinated, structured, and inclusive interaction during the educational process.

2**. Identification of technical, pedagogical, and organizational difficulties**. The questions in this part were designed to reveal the barriers that complicate learning within a hybrid environment. Respondents were offered a list of the most common problems–such as unstable internet connection, poor audio quality, difficulties accessing course materials, or the uneven distribution of instructor attention–and were also provided with the opportunity to describe their own experiences in an open-ended format. This block made it possible to obtain deeper insights into the practical nuances of hybrid pedagogical interaction, highlighting both recurring obstacles and context-specific challenges that students encounter during hybrid participation.

3. **Suggestions for improving hybrid learning**. In the open-ended questions, students articulated their recommendations regarding the enhancement of lesson organization, the strengthening of interactive components, the improvement of technical stability, and the establishment of more equitable conditions for participation. These responses made it possible to identify specific directions for further refinement and development of the hybrid format, which are essential for formulating methodo-

logically grounded recommendations aimed at optimizing hybrid teaching and learning practices in higher education.

This approach enabled the collection of comprehensive data on cognitive, emotional, and organizational aspects of student interaction with hybrid learning.

Hybrid learning requires enhanced informational support, as the effectiveness of this model significantly decreases without clear and timely communication. Despite the considerable list of challenges noted by students, a portion of respondents expressed a positive attitude toward the hybrid format. The analysis of their answers revealed several positive characteristics of hybrid learning that contribute to improved accessibility, flexibility, and individualization of the educational process. Respondents emphasized that the combination of in-person and online participation creates more comfortable conditions for mastering material and allows diverse learning styles and student needs to be accommodated more effectively.

First, a significant number of students highlighted the convenience and flexibility of the hybrid format. The ability to join a class online when physical presence is not possible–due to transportation difficulties, health conditions, or personal circumstances–was viewed as a major advantage. Students stressed that this model prevents them from missing classes and helps maintain continuity in their studies, which is particularly important under external crisis conditions.

Second, respondents noted the psychological comfort associated with hybrid participation. Some students feel more confident in an online environment, which reduces anxiety during discussions and makes it easier to ask questions and express personal opinions. Thus, the hybrid model can enhance the engagement of students who are typically less active in the classroom.

Third, among the positive aspects, students pointed to the balanced combination of different learning formats, which enriches the diversity of their educational experience. Those attending in person appreciated the direct contact with the instructor, whereas online participants valued the accessibility of learning materials, the opportunity to revisit content, and the ability to maintain a pace suited to their individual needs. Respondents emphasized that simultaneous interaction across two environments creates a dynamic learning space that integrates traditional pedagogical communication with digital tools.

Fourth, students reported improvements in digital literacy and communication skills, as hybrid learning involves active use of online platforms, digital resources, shared documents, and virtual communication channels. This was viewed as an important component of preparation for the contemporary professional environment.

Finally, some respondents positively evaluated the opportunities for individual work created by the hybrid format. Online participants often find it easier to structure their time, quickly access learning materials, and use additional resources during class, which, in their view, enhances learning productivity.

In summary, the survey results indicate that hybrid learning possesses several significant advantages related to flexibility, accessibility, psychological comfort, and the development of digital competencies. These aspects can serve as the basis for developing methodological recommendations aimed at further improving the hybrid model, particularly through enhancing interactivity, personalization, and student support within the digital environment.

Taking into account all comments submitted by students in the survey, the findings provide an important point of reflection and a starting ground for improvement. At present, some of the shortcomings identified by students have already been partially addressed. For example, the issue of unstable internet caused by power outages has been partly alleviated by the installation of generators at the university, which ensure uninterrupted electricity supply, as well as by the adoption of fibre-optic networks that provide more stable connectivity. However, the lack of adequate technical resources among students remains an unresolved problem.

Organizational issues–such as schedule changes and late notifications–have been partially mitigated through the introduction of an electronic timetable. Nevertheless, the human factor remains significant, as it is not always possible to plan class cancellations or rescheduling in advance.

Concerns regarding fairness and transparency in assessment have also been partly addressed by transferring certain major test assignments into the field of independent work, which students can complete at a time convenient for them. In this way, the practice of hybrid learning allows instructors and students to better understand the specifics of this format, adapt to them, and find mutually beneficial solutions advantageous for both students, instructors, and the university administration.

Communication and informational support issues have been effectively addressed through the use of the messaging system in Moodle or external messengers, which may be more convenient for both instructors and students.

Drawing on the list of advantages and, especially, disadvantages identified by students participating in instructional activities within the hybrid format, it becomes possible to formulate methodological recommendations that may be useful for higher education institutions considering this format as a future-oriented educational model.

One of the key components for improving hybrid interaction is ensuring that classrooms are equipped with modern technical devices. For instance, boundary microphones and ceiling microphones, designed to capture sound throughout the room, may be used. Boundary microphones eliminate the need to mic each person individually or acoustically treat the entire room. Wide-angle cameras with autofocus and instructor-tracking functionality can support high-quality video delivery and allow online students to observe the learning process fully and participate seamlessly in all types of classroom activities.

Another factor supporting effective hybrid interaction is equipping classrooms with dedicated instructional laptops or computers configured specifically for hybrid lessons and creating a unified technical standard for all rooms. This minimizes technical differences and ensures stability during classes. Consequently, regardless of the classroom, both students and instructors can be confident that a change in location will not create additional challenges or inconveniences.

Enhancing the digital competence of instructors is also a critical component of effective hybrid education. Implementing hybrid teaching is impossible without systematic support for instructors in the area of digital technologies and without timely technical assistance during classes. This requires regular training sessions and workshops aimed at mastering synchronous and asynchronous teaching tools such as Zoom, Moodle, Google Workspace, interactive whiteboards, and other digital platforms. Such training should combine demonstration and practical elements, granting instructors the opportunity to practice skills under real conditions. These training activities help reduce anxiety associated with the use of digital tools, assist in overcoming barriers common among older faculty, and establish sustainable technological practices in everyday teaching.

Another essential component of support is providing access to immediate technical assistance during classes. The creation of a "hotline" or a special technical support chat allows for rapid response to issues such as connectivity problems, audio settings, camera malfunctions, or LMS errors, thus minimizing interruptions in the learning process. This mechanism strengthens instructors' sense of security and reduces the risk of class disruptions due to technical failures–a particularly important aspect in the hybrid format, where technological stability is critical.

The development of accessible instructional materials also plays a key role. Step-by-step video tutorials and concise guides serve as quick references that help instructors locate necessary information on tasks such as configuring online conferences, creating electronic assignments, or collaborating on interactive boards. This format substantially reduces the time instructors spend mastering new tools and decreases the load on technical support services through self-resolution of frequent issues.

The mentoring model is another important form of support, where instructors with higher levels of digital competence assist colleagues who are only beginning to adopt new technologies. Such men-

torship facilitates the exchange of practical experience, builds supportive professional communities, and fosters a culture of mutual learning within the university. For instructors of older generations, this format is particularly valuable, as it allows them to receive help in a trusting environment without additional stress or formal pressure. Mentorship may include assistance in preparing for classes as well as support during real-time lectures or seminars.

Altogether, the combined use of these approaches not only improves digital literacy but also creates a stable environment for the uninterrupted functioning of hybrid education. As a result, instructors gain confidence in using technologies, while students benefit from higher-quality and more accessible communication regardless of their mode of participation. The overall quality of pedagogical interaction improves, its structure becomes more balanced and equitable, and the hybrid format becomes more predictable, manageable, and comfortable for all participants of the educational process.

To ensure equality among participants, the "dual addressing" approach may be implemented, allowing the instructor to repeat or duplicate information for both groups – online and in-person. Another effective technique is to periodically direct questions specifically to online participants, thereby maintaining balanced participation and ensuring that each student feels included. From a technological perspective, it is necessary to install a screen or monitor within the instructor's direct line of sight, enabling continuous visual contact with online students and allowing instructors to respond promptly while integrating collaborative tools (Mentimeter, Jamboard, Padlet, Zoom Whiteboard) that connect all students regardless of attendance mode.

The uneven participation of online and in-person students in discussions can be resolved through clearly structured timing and discussion stages, following a sequence such as: classroom participants – online participants – joint summary; alternatively, online students may be invited to moderate discussions. Differences in control and academic integrity may be managed by combining oral and written assessments, designing assignments that include creative, analytical, or project-based elements (which are difficult to plagiarize), conducting brief oral checks after tasks, and implementing a "camera-on" rule during assessments.

One of the negative aspects highlighted in the survey was the inconvenience associated with the timetable. To reduce student workload, the schedule may be optimized by grouping hybrid-format classes into a single day or block, allowing students to choose their preferred mode of participation (in-person or online) with prior approval, and expanding the use of asynchronous materials such as lecture recordings, video instructions, and presentations.

Communication issues–which constitute a central part of effective pedagogical interaction–may be addressed by establishing a unified communication system for each group based on the learning platform or external tools. Such a space allows instructors to summarize sessions (learning recaps) and distribute materials or assignments. However, communication outside the classroom environment requires agreed-upon rules to ensure consistency and professionalism.

Conclusion. The results of the conducted theoretical analysis and empirical investigation demonstrate that, under contemporary crisis conditions, hybrid learning emerges not only as a necessary response to external challenges but also as a promising and pedagogically valuable model for organizing the educational process in higher education institutions. The study achieved its primary goal – to analyze the features of pedagogical interaction within a hybrid environment and to identify the factors that either enhance or hinder its effectiveness – by integrating conceptual examination with the analysis of student survey data.

Through a comprehensive review of scholarly sources, the research clarified the theoretical foundations of pedagogical interaction and outlined how these foundations are transformed within hybrid educational settings. This theoretical component made it possible to identify the structural, communicative, and technological characteristics that define interaction in hybrid formats. The empirical component, based on students' responses, allowed for the practical verification of these assumptions

and provided detailed insights into the real conditions, challenges, and benefits experienced by participants in the hybrid learning process.

The findings show that the interactional dynamics of hybrid learning are shaped by several critical dimensions: technological stability, the inclusiveness of communication, equitable access to participation, and the digital competence of instructors. The analysis also confirmed that the effectiveness of hybrid learning depends on the balance between online and face-to-face components, as well as on the clarity and consistency of organizational procedures. Importantly, despite the presence of technical and communicative difficulties, students identified numerous strengths of the hybrid model, including flexibility, psychological comfort, opportunities for individualized learning, and the development of digital literacy – all of which significantly expand the educational potential of this format.

The research also fulfilled the task of identifying the main obstacles to effective hybrid interaction. Students pointed to unstable internet connections, insufficient classroom equipment, uneven distribution of instructor attention, organizational inconsistencies, and varying levels of digital readiness among participants. Addressing these issues made it possible to outline concrete directions for improvement. Accordingly, the study formulated evidence-based recommendations related to the modernization of technical infrastructure, the establishment of unified communication systems, the enhancement of instructor digital competence, and the development of institutional mechanisms for technical and methodological support.

Thus, the study concludes that hybrid learning can ensure high-quality pedagogical interaction, provided that classrooms are adequately equipped, transparent and consistent rules of interaction are established, and instructors are supported at the institutional level. Key areas for further enhancement include the development of digital support systems, the standardization of organizational processes, the expansion of interactive tools, and the strengthening of balanced participation between online and in-person students.

In summary, hybrid learning can become an effective, sustainable, and inclusive model of modern higher education when supported by comprehensive technical, pedagogical, and communicative mechanisms aimed at improving the quality of interaction and ensuring equal learning opportunities for all students.

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