

ORIGINAL

## Leveraging Gamification to Sustain Student Motivation and Emotional Resilience in Higher Education During Wartime: Case Studies from Ukraine

### Aprovechamiento de la gamificación para mantener la motivación y la resiliencia emocional de los estudiantes de enseñanza superior en tiempos de guerra: Casos prácticos en Ucrania

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#### ABSTRACT

In the conditions of war in Ukraine, the educational process underwent profound transformations, accompanied by a decrease in student motivation and an increase in emotional exhaustion. The relevance of the topic was due to the need to find effective psychological and pedagogical tools to support student engagement in times of crisis. The purpose of the study was to find out the impact of gamification on student motivation; the object was the educational process in higher education institutions during the war. The research methodology was based on a questionnaire, comparative analysis, qualitative interviews, and empirical observation of gamified educational practices in three higher education institutions. The results of the study showed that team gamification, the use of adaptive online platforms, and instant feedback mechanisms were the most effective in wartime. Gamification was shown to increase academic engagement, reduce anxiety, and raise satisfaction with the learning process. Particularly high rates were recorded among psychology and engineering students. Gamified elements, such as virtual rewards, interactive missions, and cooperative tasks, proved to be effective not only in terms of learning but also in providing emotional support. The practical significance of the results lay in the possibility of adapting the cases to other educational contexts and developing strategies to overcome motivational decline during a crisis. The findings could be useful for teachers, educational administrators, and content developers who were looking for innovative solutions in the face of uncertainty.

**Keywords:** Gamification; Student Motivation; Education In Times Of War; Emotional Resilience; Digital Platforms; Higher Education.

#### RESUMEN

En las condiciones de guerra en Ucrania, el proceso educativo sufrió profundas transformaciones, acompañadas de una disminución de la motivación de los estudiantes y un aumento del agotamiento emocional. La relevancia del tema se debió a la necesidad de encontrar herramientas psicológicas y pedagógicas eficaces para apoyar el compromiso de los estudiantes en tiempos de crisis. El propósito del estudio era averiguar el impacto de la gamificación en la motivación de los estudiantes; el objeto era el proceso educativo en instituciones de enseñanza superior durante la guerra. La metodología de la investigación se basó en un

cuestionario, un análisis comparativo, entrevistas cualitativas y la observación empírica de prácticas educativas gamificadas en tres instituciones de enseñanza superior. Los resultados del estudio mostraron que la gamificación en equipo, el uso de plataformas online adaptativas y los mecanismos de retroalimentación instantánea fueron los más eficaces en tiempos de guerra. Se demostró que la gamificación aumentaba el compromiso académico, reducía la ansiedad y aumentaba la satisfacción con el proceso de aprendizaje. Se registraron índices especialmente altos entre los estudiantes de psicología e ingeniería. Los elementos gamificados, como las recompensas virtuales, las misiones interactivas y las tareas cooperativas, demostraron su eficacia no sólo en términos de aprendizaje, sino también de apoyo emocional. La importancia práctica de los resultados residía en la posibilidad de adaptar los casos a otros contextos educativos y desarrollar estrategias para superar el declive motivacional durante una crisis. Los hallazgos podrían ser útiles para profesores, administradores educativos y desarrolladores de contenidos que buscaran soluciones innovadoras ante la incertidumbre.

**Palabras clave:** Gamificación; Motivación del Alumnado; Educación en Tiempos de Guerra; Resiliencia Emocional; Plataformas Digitales; Educación Superior.

## INTRODUCTION

In the twenty-first century, education is increasingly facing challenges that go beyond traditional pedagogy: technological transformations, increased psychological stress on students, and, in the Ukrainian context, a full-scale war. Under conditions of constant stress, instability, and distance learning, not only the quality of knowledge acquisition, but also the level of motivation of students is critically reduced. It is in such crisis situations that there is a need to introduce innovative, flexible, and humane educational practices, including gamification as a tool to support emotional resilience and educational engagement. Gamification, as the use of game mechanics in non-game contexts, including in the educational process, is gaining popularity as a means of generating intrinsic motivation, social interaction, and positive feedback.<sup>(1,2)</sup>

Reputable studies show its effectiveness in different disciplines and levels of education,<sup>(3,4,5)</sup> in particular in conditions of increased psychological stress. The practice of using gamified platforms (Kahoot, Genially, ClassTime) demonstrates the potential not only to improve academic performance, but also to create a sense of security, stability, and cohesion in the educational environment.<sup>(6,7)</sup>

Despite the existing research, most of it is based on peacetime conditions, stable environments, or disciplines that do not take into account the psychosocial context of war. Currently, it is not well understood how gamification affects the emotional state of students in crisis situations, which mechanics are most effective in conditions of constant stress, and how its use can ensure the sustainability of the educational process in times of war. At the same time, the issues of the long-term effect of gamification, the influence of cultural context, a differentiated approach to specialties, and the ethical aspects of gamified influence remain to be fully explored.<sup>(8,9)</sup>

Recent years have been marked by an active interest in gamification as an effective means of maintaining motivation in education, especially in conditions of stress, uncertainty, or distance learning. A number of studies have considered personalized approaches to gamification that take into account the psychological state of students in crisis situations.<sup>(1,2,7)</sup> At the same time, a number of authors emphasize the importance of flexible platforms and adaptation elements that allow individualizing the learning process.<sup>(10,11,12,13)</sup> Gamification is being actively studied both in technical disciplines<sup>(6,14)</sup> and in educational management and pedagogy,<sup>(3,4,15)</sup> where it demonstrates a positive impact on academic engagement and soft skills. In particular, the studies by Slamet and Meng<sup>(16)</sup> and Latorre-Coscolluela et al.<sup>(4)</sup> confirm the effectiveness of gamification in collaborative learning. At the same time, other authors draw attention to the need to train teachers and involve them in the design of gamified scenarios.<sup>(17,18)</sup> The three articles together focus on how digitalisation affects the individual cognition and public administration. In Akimova et al.,<sup>(19)</sup> the authors investigate how the levels of mental development and speech development of little ones affects their understanding of internet texts. Higher cognitive and linguistic abilities enhance stages of reception and interpretation which increase ability to understand online content. As presented by Ortina et al.,<sup>(20)</sup> digital transition can bring economic benefits in terms of service delivery and governance outcomes for public administration. According to Yermachenko et al.,<sup>(21)</sup> smart infrastructure management within a digital society is about socio-economic aspects and the need for the adaptive public management strategies. Together these studies draw out a crucial relationship between the digital competencies and infrastructure, as they relate to each individual's interaction with digitized content, as well as related to the efficiency and capability of public sector operations.

The integration of augmented and virtual reality technologies within gamification is seen as a resource for increasing self-regulation, cognitive activity, and reducing anxiety.<sup>(22,23,24)</sup> In addition, the importance of the

context of use is emphasized: studies in a stable educational environment show a different effect compared to learning in crisis circumstances.<sup>(8,9,25)</sup> Some authors draw attention to the ethical challenges of gamification, in particular, the risk of superficial use or manipulation of learners' behavior.<sup>(8,26)</sup> At the same time, others support the concept of a socially oriented approach, when gamification acts as a factor of cohesion and emotional support in conditions of instability.<sup>(1,2,5)</sup> Thus, current scholarship agrees that effective gamification in education should be adaptive, emotionally responsive, contextually embedded in the learning process, and combine technological innovation with pedagogical purpose.<sup>(1,3,6,7,27)</sup>

Additional research focuses on highly specialized aspects of gamification, such as in medical education,<sup>(15,28,29)</sup> driving,<sup>(30)</sup> and inclusive learning for people with disabilities.<sup>(26,31)</sup> They demonstrate the potential of gamification to adapt content to the specific cognitive and physical characteristics of target groups. In turn, the study of systems thinking within gamification design<sup>(25)</sup> emphasizes the need for a deep, interdisciplinary approach to building game environments that goes beyond technical implementation. The approach to gamification as a means of engaging users in virtual learning communities is also explored in Yang et al.<sup>(13)</sup> and Uchôa et al.,<sup>(12)</sup> which emphasize the impact of gamified interfaces on building a sense of community, knowledge sharing, and mutual support. Particular attention is paid to transversal competencies and student performance in the process of conceptual modeling,<sup>(4,14)</sup> as well as to the growing interest in learning through competition and reflection. At the same time, a number of authors emphasize the risks of formalizing gamification - when, instead of deepening the content, there is a superficial copying of game elements without a didactic basis.<sup>(8,9)</sup> This calls for a strategic rethinking of educational approaches, where gamification is not a goal but a means of achieving sustainable academic and emotional engagement.

Despite the growing number of studies, the long-term impact of gamification strategies on the quality of knowledge and the formation of professional competencies remains underdeveloped. The ethical aspect of gamification, in particular, the impact on students' autonomy and psychological safety in an unstable educational environment, also needs to be further studied.

The purpose of this paper is to study the impact of gamification as a tool to support student motivation in times of war, to characterize successful cases of its implementation in higher education institutions of Ukraine, and to find out the psychological and pedagogical conditions for the effective use of gamified strategies in the educational process during crisis situations.

## METHOD

The study was conducted during the 2023-2024 academic year on the basis of three Ukrainian higher education institutions: Lviv Polytechnic National University (software engineering), Taras Shevchenko National University of Kyiv (psychology), and H. S. Skovoroda Kharkiv National Pedagogical University (secondary education/math). The study involved 96 students who studied for one semester using gamified elements in the learning process. To collect empirical data, a questionnaire method was used with mixed questions (closed - on a Likert scale, open - for qualitative analysis of impressions).

The method of comparative analysis of the results obtained by three parameters was also used: emotional state, academic activity and subjective satisfaction with the educational process. The data were summarized and presented in the form of tables and graphs. Particular attention was paid to the analysis of cases of successful gamification implementation, which were collected through expert interviews with teachers of the relevant institutions and analysis of internal documentation (learning platforms, structured lesson plans, visual materials).

## RESULTS

In the context of wartime, when traditional educational models are exposed to the destructive effects of external stressors, gamification is seen as one of the most effective tools to support the educational process and motivate students. Its potential lies in the ability to create a psychologically safe and emotionally engaging learning environment, which is especially important in a climate of constant risk and anxiety. Current research emphasizes the adaptive and personalized nature of gamification, which allows for the individual needs of students to be taken into account in times of crisis.<sup>(7)</sup> The use of gamified platforms, such as Genially, not only increases the level of engagement, but also promotes the development of research and analytical thinking.<sup>(6)</sup>

The key approach is to integrate gamification elements into the content of academic disciplines, which allows creating situations of success and reinforcing intrinsic motivation.<sup>(4)</sup> The effectiveness of using virtual and augmented reality as part of a gamified environment is also noted, which not only stimulates cognitive activity but also reduces psychological stress.<sup>(22,23)</sup> Gamification in a crisis requires a systematic approach that combines the flexibility of digital technologies with targeted pedagogical strategies. Researchers emphasize the need to transform the role of the teacher from a source of knowledge to a facilitator of the learning process, able to adapt gamification tools to the current needs of students.<sup>(3)</sup>

In general, gamification in wartime appears not only as a methodological tool, but also as a social and

psychological resource that supports the emotional stability of students, helps to maintain their engagement in learning, and develops self-regulation skills necessary in conditions of uncertainty.<sup>(1,2)</sup>

Under martial law, maintaining students' motivation to learn becomes one of the key tasks of the educational process. Psychological and pedagogical conditions that contribute to the effective use of gamification should not only take into account the individual needs of students, but also be adapted to the high level of emotional stress, instability and remote interaction. According to the results of scientific research, gamification solutions based on the principles of self-determination, social support, flexible task differentiation, and feedback have the greatest impact on motivation.<sup>(1,2,4)</sup> Table 1 summarizes the psychological and pedagogical conditions for the effective use of gamification in crisis situations.

**Table 1.** Psychological and Pedagogical Conditions for Effective Gamification in the Educational Process in the Time of War

Psychological and pedagogical condition	Features	Expected effect
Emotional safety of the learning environment	Use of visually pleasing interfaces, calm graphics, and game elements without aggression	Reduced anxiety, increased engagement
Autonomy in learning	Providing students with the opportunity to choose the pace, path or format of completing tasks	Increased intrinsic motivation, development of responsibility
Social interaction	Involvement in team games, interactive forums, and peer review	Creating a sense of community, maintaining social ties
External reinforcement and recognition of achievements	Availability of badges, points, ratings, certificates	Stimulating activity, creating a sense of success
Content relevance and contextualization	Connection of game tasks with real situations or problems familiar to students	Increasing the practical value of tasks, increasing motivation to participate
Flexibility and adaptability of tasks	Difficulty levels, adaptation to individual progress	Maintaining interest regardless of the initial level of knowledge
Instant feedback	Automated results, tips, comments	Supporting self-esteem, creating a sense of control over the learning outcome

**Source:** created by the author based on Abbes et al.,<sup>(2)</sup> Gao,<sup>(1)</sup> Latorre-Coscolluela et al.,<sup>(4)</sup> Phosanarack et al.,<sup>(7)</sup> Alonso-Sánchez et al.,<sup>(3)</sup> Slamet and Meng<sup>(16)</sup>

Generalization suggests that effective gamification in crisis situations should be based on a combination of emotional support, adaptive design, student autonomy, and structured interaction. These conditions create a favourable educational environment in which motivation to learn is maintained despite external challenges.

In the context of a full-scale war, Ukrainian higher education institutions were forced to quickly adapt to new realities, including through the active introduction of digital tools. Among them, gamified approaches are particularly noteworthy, as they have proven effective in maintaining academic motivation and creating a positive emotional climate in groups. Many of the initiatives were implemented on the basis of interactive platforms (e.g., ClassTime, Kahoot, Genially), with elements of teamwork, intellectual competition, and visual design of the learning environment.<sup>(3,6)</sup> Table 2 summarizes the successful cases of gamification in Ukrainian higher education institutions in 2022-2024.

**Table 2.** Successful cases of gamification implementation in Ukrainian higher education institutions during the war (2022-2024)

Name of the university	Gamified tool/platform	The purpose of the implementation	Elements of gamification	Result / effect
Lviv Polytechnic	ClassTime	Activation of students during online lectures	Points, rankings, competitions	Increase attendance and quality of responses
National University of Kyiv-Mohyla Academy	Genially	Visualization of educational content	Interactive charts, game missions	Improve understanding of complex topics
Dnipro National University	Kahoot	Testing knowledge in a game form	Quizzes, timer, competitions	Active engagement even in a blended learning format
KNURE	Discord + game quests	Supporting communication and interaction	Levels, avatars, team tasks	Forming student communities, reducing the feeling of isolation
Lviv Polytechnic National University	Moodle + built-in badges	Formalization of achievements	Badges, progress bars	Increased intrinsic motivation to complete the course

**Source:** created by the author based on Aldalur,<sup>(6)</sup> Alonso-Sánchez et al.,<sup>(3)</sup> Abbes et al.,<sup>(2)</sup> Phosanarack et al.,<sup>(7)</sup> Latorre-Coscolluela et al.<sup>(4)</sup>

The analysed examples show that gamification not only supports the educational process in crisis conditions, but also allows you to maintain a sense of stability, belonging to the academic community, and intrinsic

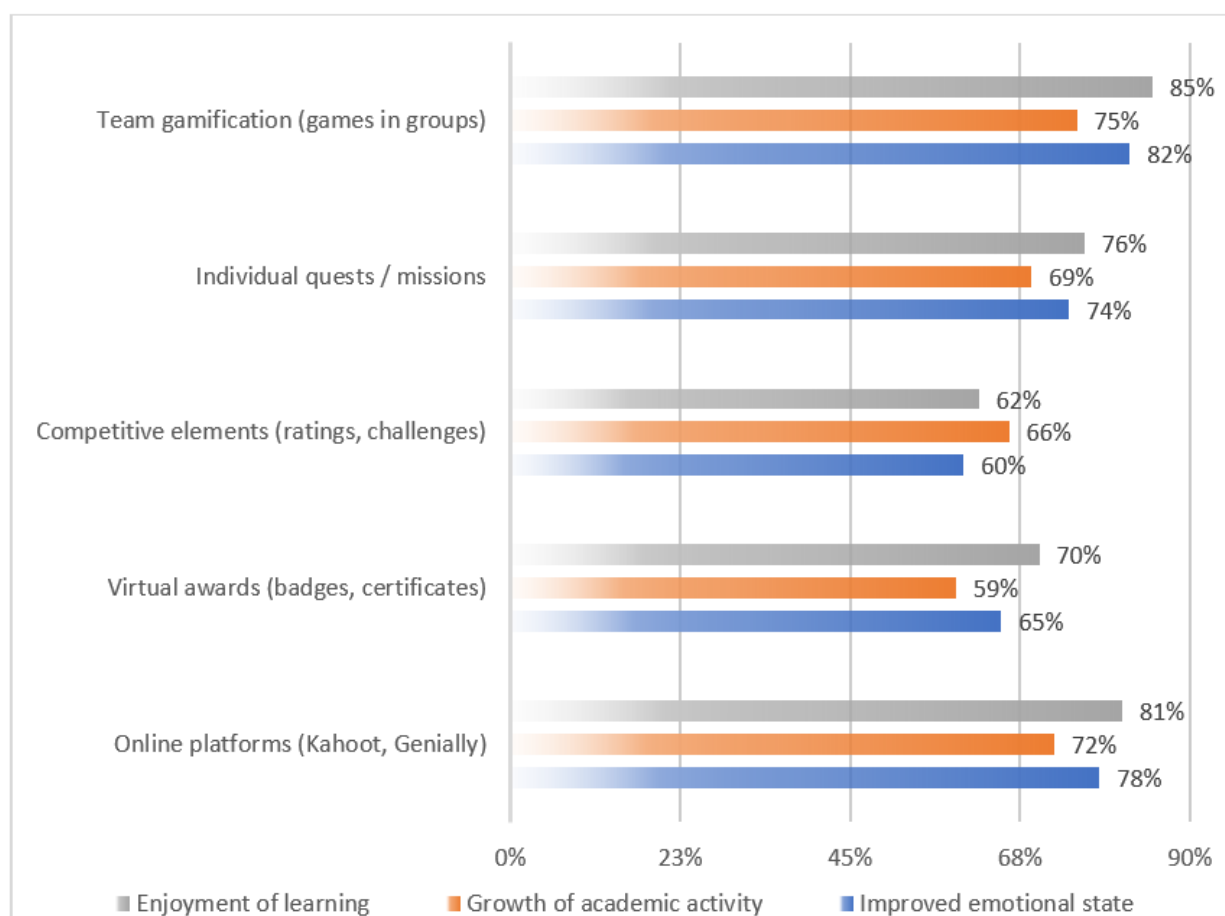
motivation to learn. Successful cases demonstrate the importance of teachers' creative approach to designing a gamified environment.

In the context of learning during wartime, it is especially important not only to maintain students' academic engagement but also to support their emotional state. The use of certain elements of gamification, such as online platforms, virtual rewards, and competitive mechanics, can stimulate interest in learning, build a sense of success, and increase subjective emotional comfort.<sup>(1,2,5)</sup> To evaluate the effectiveness of such tools, an empirical study was conducted with a focus on the emotional and cognitive components of the learning process.

The study involved 96 students from three Ukrainian higher education institutions: Lviv Polytechnic National University (software engineering); Taras Shevchenko National University of Kyiv (psychology); and H. S. Skovoroda Kharkiv National Pedagogical University (secondary education/math). Students interacted with different types of gamification tools during the semester. A mixed-scale questionnaire (Likert + open-ended questions) was used for evaluation:

- the level of emotional involvement (the sensual component of motivation),
- academic activity (attendance, assignments, participation in discussions),
- subjective satisfaction with the educational process.

The data presented in figure 1 allows us to analyse the impact of various instruments on these aspects.



**Figure 1.** Evaluation of the impact of gamification tools on students' emotional state and academic performance (in %)

As can be seen from the figure, team gamification proved to be the most effective form of influence on students in the context of war. In particular, 82 % of respondents noted an improvement in their emotional state, 75 % - an increase in academic activity, and 85 % - high satisfaction with the learning process. This demonstrates the important role of social interaction and support in a gamified environment, especially for students of humanities (psychology), who demonstrated the highest emotional sensitivity. Online platforms such as Kahoot and Genially also showed good results: 78 % of students reported an improvement in their emotional state, 72 % reported increased academic engagement, and 81 % reported satisfaction with the learning process. These tools were most positively received by software engineering students, who found visual interactivity and quick feedback to be key.

Individual quests showed balanced results in all categories: 74 % - emotional state, 69 % - activity, 76 % -



satisfaction. This may indicate the effectiveness of autonomous tasks, especially for students of pedagogical specialties who value an individual learning trajectory. Virtual rewards (badges, certificates) had a smaller but consistently positive effect: 65 % of students reported emotional improvement, 59 % - academic activity, 70 % - satisfaction. This tool has a greater impact on extrinsic motivation, so it can be effective as an additional component rather than the main incentive. Competitive elements showed the lowest results: only 60 % of respondents reported an improvement in their emotional state, 66 % - an increase in activity, and 62 % - satisfaction. This can be explained by the fact that in times of war, competitions can cause additional stress or frustration, especially for students with high anxiety. However, it is worth noting that these elements can be useful in short-term activities or in a safe competitive environment.

Thus, team gamification and the use of online platforms are the best in terms of the set of indicators. At the same time, competitive elements are less clearly perceived: although they stimulate activity, they cause additional anxiety in some students. Thus, to achieve a stable positive effect, it is important to adapt gamification tools to the emotional characteristics of the target audience.

Under the influence of hostilities, instability, and psychological fatigue, gamification in education is gaining new meaning as a tool not only for motivation but also for emotional support, stabilization of the learning process, and social cohesion of students. However, its further implementation in the face of uncertainty requires a strategic approach that takes into account risks, barriers, and new educational realities. Table 3 summarizes practical recommendations that may be useful for teachers, university administrators, and educational content developers.

**Table 3.** Recommendations for implementing gamification in conditions of uncertainty and instability

Direction of implementation	Recommendation.	Expected result
Pedagogical design	Develop gamified tasks with variability of passing	Increasing students' sense of autonomy and control
Emotional well-being of students	Use calm visual elements, non-violent metaphors	Reducing anxiety, creating a psychologically safe environment
Formation of communities	Involve students in team activities, create spaces of interaction	Strengthening social ties, reducing feelings of isolation
Flexibility and adaptability	Adapt tools to the context (offline, online, blended learning)	Continuity of the educational process in different circumstances
Reflection and feedback	Integrate quick and positive feedback into gamified elements	Strengthening intrinsic motivation and self-esteem
Technical accessibility	Use platforms with low device and internet requirements	Ensuring equal access to participation in education
Increasing digital competence	Organize trainings for teachers on gamified learning	Increasing the effectiveness of implementation and innovation culture in higher education institutions

**Source:** created by the author based on Phosanarack et al.,<sup>(7)</sup> Gao,<sup>(1)</sup> Abbes et al.,<sup>(2)</sup> Alonso-Sánchez et al.,<sup>(3)</sup> Lampropoulos and Kinshuk<sup>(23)</sup>

The analysis shows that the effective implementation of gamification in conditions of instability is possible only with a holistic pedagogical approach: when technological solutions are supported by emotional sensitivity, inclusiveness, and interaction orientation. It is especially important to avoid an overemphasis on competition, giving preference to cooperation and support.

## DISCUSSION

The results obtained indicate a positive impact of gamification tools on students' motivation, emotional state, and academic performance during the war. In particular, team-based forms of gamification and the use of adaptive online platforms proved to be the most effective, contributing to a reduction in anxiety and an increase in emotional stability. These findings are consistent with the results of studies by Abbes et al.<sup>(2)</sup> and Latorre-Cosculluela et al.,<sup>(4)</sup> who also noted that engaging students in collective interaction in a gamified environment increases their motivation and reduces the risk of emotional burnout. At the same time, some authors are critical of the widespread use of gamification in education during crises. For example, Nyholm<sup>(8)</sup> draws attention to potential ethical challenges and the risk of manipulating student behavior through game elements that can mask the true quality of educational content. A similar opinion is expressed by Wagenpfeil,<sup>(9)</sup> who emphasizes that gamification often boils down to superficial interface changes without any real impact on the depth of knowledge acquisition.

Instead, the results of our study provide grounds to support the position of such authors as Gao<sup>(1)</sup> and Phosanarack et al.,<sup>(7)</sup> who substantiate the importance of self-determination and personalization in gamified learning. Our own survey of students confirms that those forms of gamification that allow them to choose how

to interact with tasks, receive instant feedback, and feel part of an educational community have the greatest effect. Thus, the effectiveness of gamification directly depends on its contextual integration into the didactic process, rather than on the formal use of game mechanics. Some differences in the authors' conclusions can be explained by differences in research samples, disciplinary context, and cultural and educational environment. For example, the study by Alonso-Sánchez *et al.*,<sup>(3)</sup> conducted in a stable educational environment, favors competitive elements, while in our study they were the least effective, presumably due to students' increased sensitivity to stress in wartime.

Thus, our results are partially consistent with previous studies, but also extend the existing understanding of the effectiveness of gamification, especially in crisis contexts. This allows us to suggest that gamification can be not only a tool for improving academic performance, but also a psychological buffer to maintain educational stability in the face of force majeure.

At the same time, the study has its limitations, including a limited sample (96 students from three universities), lack of control over the duration of exposure to gamification tools, and differences in the level of digital literacy among students. Further research should focus on an interdisciplinary analysis of the impact of gamification, taking into account gender, cultural, and psychological factors, as well as on the development of universal but adaptive game design models for education in times of crisis uncertainty.

## CONCLUSIONS

In wartime, gamification has proven to be not only an innovative pedagogical tool, but also an important psychosocial support for students in a state of constant anxiety and uncertainty. The results show new approaches to using gamification as a means of strengthening intrinsic motivation, maintaining emotional stability, and forming sustainable educational communities. It was expected that gamified tools would have a positive impact on engagement in learning, but the observed effect of reducing anxiety and increasing satisfaction with the learning process in situations beyond the academic context is novel. The practical significance of the work lies in the possibility of using the cases and analytical findings as a basis for developing adaptive educational strategies in crisis environments. The limitation of the study was the limited sample and the lack of long-term monitoring of the impact of gamification practices. Further research should focus on cross-cultural analysis of gamification in the wartime and post-war periods, on assessing its impact on academic performance in different types of disciplines, and on exploring the relationship between types of motivation and specific game mechanics. The authors are convinced that the future of gamification lies not only in technological innovations, but in its ability to humanize the educational process, creating a space for trust, support, and growth even in the most difficult conditions.

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## CONFLICT OF INTEREST

None.

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