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# Gamification of the educational process in distance education


## Gamificación del proceso educativo en educación a distancia

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### Abstract

The aim is to study and analyse the potential and efficiency of gamification in the educational process, in particular within the context of distance education. During the course of the study, the testing method, the method of expert evaluation, and the method of determination of the efficiency of the influence of gamification on educational process efficiency were used. Statistical methods such as standard deviation and a chi-squared test were used for processing the received results. Test reliability was verified using Cronbach's alpha. The results demonstrate that gamification improves educational material mastering, develops creative skills, and enhances the quality of joint work in a virtual environment. Students get more motivated to participate in the educational process due to gamification. The average number of correctly solved tasks for the experimental and control groups was determined to evaluate study results in quantity. Thus, experiment results showed that students of the experimental group correctly performed final tests for 2,66 tasks more than those of the control group, and in general, students of the experimental group correctly performed 1,76 tasks. In distance education, gamification becomes a perspective and effective approach, oriented towards the enhancement of the academic achievements and motivation of students.

**Keywords:** educational technologies, gaming technologies, higher education, innovations, motivation.

## Resumen

El objetivo es estudiar y analizar el potencial y la eficiencia de la gamificación en el proceso educativo, en particular en el contexto de la educación a distancia. Durante el estudio se utilizaron el método de prueba, el método de evaluación de expertos y el método de determinación de la eficacia de la influencia de la gamificación en la eficiencia del proceso educativo. Para procesar los resultados recibidos se utilizaron métodos estadísticos como la desviación estándar y la prueba de chi-cuadrado. La confiabilidad de la prueba se verificó mediante el alfa de Cronbach. Los estudiantes se motivan más para participar en el proceso educativo gracias a la gamificación. Se determinó el número promedio de tareas resueltas correctamente para los grupos experimental y de control para evaluar los resultados del estudio en cantidad. Así, los resultados del experimento mostraron que los estudiantes del grupo experimental realizaron correctamente las pruebas finales en 2,66 tareas más que los del grupo de control y, en general, los estudiantes del grupo experimental realizaron correctamente 1,76 tareas. En la educación a distancia, la gamificación se convierte en una perspectiva y enfoque eficaz, orientado a la potenciación de los logros académicos y la motivación de los estudiantes.

**Palabras clave:** educación superior, innovaciones, tecnologías de juego, tecnologías educativas, motivación.

## Introduction

### Relevance

The development of the information society makes the issue of the efficiency of digital gaming technologies relevant in the conditions of distance education. The use of game methods in the educational process has become one of the important spheres of research in recent years (Mohammed & Hirai, 2021).

The notion of 'gamification' was introduced into scientific discourse by a group of scientists in 2011. It provides for the use of approaches that are characteristic of the game in non-gaming processes. According to this conception, it is possible to state that gamification is a new discipline with a large potential. Due to these, studies of the essence and distinctive features of gamification, which are studied by different concepts of the use of game elements in the process of education modernisation, remain relevant (Lampropoulos, 2024).

Gamification is the process of using game elements and mechanics in non-game contexts to increase the engagement, motivation and effectiveness of participants Vasylenko and Vasenko (2023). In distance education, gamification is used to stimulate students' activity and interest in the educational process. Key elements of gamification include:

1. Implementation of a system of points that students can earn for completing certain tasks or achieving certain goals.
2. Dividing the learning process into different levels that students can gradually go through while getting a sense of progress.
3. Using symbolic awards to recognise achievements and motivate further development.
4. Creation of leaderboards that allow students to see their achievements compared to other course participants.
5. Implementation of various tasks that stimulate students to actively participate and independently search for solutions Chizhikova (2023).

There are different approaches to gamification in distance education. One of them is the use of full-fledged game environments, where learning occurs through the game process. Another approach is to integrate individual game elements into traditional educational platforms. Despite the numerous advantages of gamification, there are also certain limitations and possible negative consequences of its use. One of the



main challenges is the risk of students focusing too much on collecting points and badges, which can distract them from the main goal of learning. Inadequate implementation of gamification elements can lead to loss of motivation if tasks become too difficult or, on the contrary, too easy. Ensuring equal access to resources and opportunities for all students is also an important aspect to avoid creating inequalities in the learning environment. This study will use the pedagogical conditions for the introduction of gamification elements into the educational process.

Modern studies underline both the positive and negative consequences of gaming technology application in education. The consequences of gaming technology usage are understudied. The issue of the efficiency of gaming technologies in education and the educational process remains relevant. Due to this, the role of gaming technologies in the educational process, based on the provisions of the systemic nature of implementation of the distance form of education, should be considered on the theoretical level (Kryshtanovych et al., 2022).

It is possible to state the solution to numerous pedagogical problems and tasks lies in the sphere of informational, and digital educational technologies and the psychological and pedagogical conditions of their usage (Nonthamand & Suaklay, 2021). One of the relevant directions of the use of informational, digital educational technologies in the educational process is the concept of gamification. Pedagogical conditions of gamification implementation into the educational process under conditions of distance education contain the following provisions:

- use of gaming approaches for non-game processes to enhance participants' engagement in the solution of given tasks;
- adaptation and wide use of video games in everyday life;
- use of game elements and techniques of game design in a non-game context.
- introduction of gamification elements in the educational process provides for the use of various devices aimed at:
  - attention attraction and retention;
  - differentiation of long-term unclear and short-term clear objectives;
  - development and introduction of the system of victories and relevant risks;
  - establishing compliance between abilities and difficulty of tasks, which should be solved;
  - modelling of game situations within the process of which knowledge, skills, and abilities in a certain sphere should be formed (Ministry of Education and Science of Ukraine, 2023).

Individual and team games especially motivate students to achieve results. Two different approaches can be defined within the process of gamification of online education and distance education. The first lies in gamification elements introduction into the system of education management, while the second - in parallel gamification of the system of education management and education system itself (Mehed, 2020).

One of the key issues arising within the context of distance education is motivating students and ensuring their effective studying. Due to this, the use of gamification is an innovative approach to the improvement of the distance educational process. Motivation is an important component of academic achievements, and it may be especially fragile in distance education (Christopoulos & Mystakidis, 2023). Students can experience a lack of motivation for active participation in education, as well as a lack of interaction with fellow students and teachers. Gamification offers a new method of solving this issue, using elements of the game to cause curiosity and strive to achieve educational goals (Yaroshenko et al., 2022).

It is important to determine the influence of gamification on education efficiency, particularly within the context of distant educational environments. Can gamification enhance the level of students' motivation? What particular elements of gamification contribute to the enhancement of educational outcomes? Are there limitations or possible negative consequences of the use of gamification in distance education?



These questions become the basis of this study, directed at the determination of the role of gamification in the improvement of the quality and effectiveness of distance education. Understanding the influence of gamification on motivation and the educational process will help to develop effective strategies for this approach implementation into modern educational practice (Pereyaslavska & Smagina, 2019).

The study mainly focuses on the influence of gamification on the motivation and effectiveness of students within the context of distance education. Concentrating on solving tasks related to remote educational environments, it is necessary to analyse the level to which game elements can stimulate active participation and improve the quality of education. Study results will provide valuable information for gamification introduction into distance education, enhancing the efficiency of the educational form.

### **Purpose**

The study aims to study and analyse the possibilities and efficiency of gamification use in the educational process, in particular within the context of lecturing using distance technologies.

### **Tasks /questions**

1. To study the influence of gamification on the level of motivation formation.
2. To study peculiarities of the formation of academic achievements of students of control and experimental groups.
3. To determine statistically significant differences in academic achievements.

### **Literature Review**

In their work Kryshchanovych, Kryshchanovych, Stepanenko, Brodiuk and Fast (2021) consider the methodological approach to determination of the main factors of creative thinking development in students of creative professions. The study determines key aspects, influencing creativity development in the educational process. In particular, the article focuses on the determination and analysis of the factors, which contribute to the formation of creative thinking in students, which select creative spheres. The authors use a systemic approach and empiric methods to study the influence of different factors such as education, environment, and studying style on creative potential development. This article is an important contribution to understanding the process of creative thinking formation in students of creative professions.

The article written by a group of authors, Samodumska, Zarishniak, Tarasenko, Buchatska, Budas and Tregubenko (2022), studies gamification use in non-formal adult education. The authors analysed the designation and influence of gamification on the educational process of adults in detail. The work aims to determine effective practices of gamification within non-formal education and define their potential for improving the motivation and effectiveness of education. The use of gamification in non-formal adult education is a relevant theme, and this article contributes to understanding the influence of gamification strategies on educational processes within this context.

The study by Sadovets, Martynyuk, Orlovska, Lysak, Korol and Zembytska (2022) reveals the issue of gamification use in the non-formal educational environment of higher education within the context of digital transformation of education. The authors studied the influence of gamification on educational processes under conditions of non-formal education, in particular outlining aspects of the digital transformation of education. The authors use study methods to determine how gamification can enhance the efficiency of informal education in higher educational institutions. The study makes a valuable contribution to understanding the role of gamification in non-formal educational space and underlines its significance within the context of the modern digital paradigm.



The use of gamification and machine-based learning for attention retention and education improvement in class environments is considered in Duggal, Gupta and Singh (2021). The authors provide a detailed review of the gamification method, in which they use methods of at-home machine learning for the creation of effective learning strategies. The article analyses the influence of these approaches on in-class interaction and students' abilities development. The article differs by its uniqueness, as it combines gamification with the use of innovative methods of machine learning to achieve more efficient results in education.

The study by Alahmari et al. (2023) is a systematic review of modern trends and gaps in empirical studies of gamification in education with a focus on science. A systematised approach was used for literature evaluation and analysis to detect popular trends and understudied areas in gamification studies in science education. This approach allows the authors to identify the advantages and disadvantages of previous studies and determine the perspectives of further scientific studies in this area. The work makes a valuable contribution to understanding the current state and directions of further studies in the area of gamification in science education.

In their study, Montiel-Ruiz, Sánchez-Vera and Solano-Fernández (2023) reveal the use of social networks and gamification in physical education with the use of a particular case. They present a detailed analysis of the influence of these methods on students studying and interactions in physical education. This study aims to reveal the efficiency of the use of social networks and gamification for engaging students and improving their physical development. Using the case study, they ensure the use of particular examples of successful implementation of these strategies in physical education.

In her work, Kurbonova (2023) studies the principles of gamification of educational processes. The author investigates multifaceted aspects of gaming elements' integration into the educational environment. The importance of gamification for the enhancement of interest and motivation of students is underlined in the article. The author emphasises the potential of gamification for academic honesty enhancement and promoting studying during the whole life. Considering the principles in the basis of this approach, the article provides valuable information on the theoretical principles of gamification in education.

Chizhikova (2023) focuses on the study of the interaction between gamification of the educational process and the development of educational autonomy of students in higher educational institutions. The author analyses how gamification introduction contributes to the activation of self-studying and the development of students' initiative. The work offers a new opinion on the role of gamification in the upbringing of students as independent individual participants in the educational process.

Vasylenko and Vasenko (2023) study the influence of gamification in the educational process of the higher educational institution. They consider technological, economic, and technical aspects of gamification in information society. The study uses materials from the International Scientific Internet Conference and aims to analyse the influence of gamification on the formation of educational strategies under conditions of society modernisation and covers key aspects of gamification in higher educational institutions.

Trischuk, Figol and Volyk (2020) and Diachenko, Kalishchuk, Zhylin, Kyyko and Volkova (2022) study the efficiency of gamification as the means of attention attraction in electronic media. The authors emphasise the necessity of gamification for enhancing interaction and participation of the audience in electronic media platforms. The study indicates the significant influence of gamification on consumers' attention attraction and the creation of effective strategies for the media industry. The use of gamification in electronic media is studied from the perspective of not only attention enhancement but also improvement of interaction and satisfaction of the users.

Many issues in the area of gamification in education remain understudied and require the attention of researchers. One of the aspects lies in the detailed consideration of the influence of gamification on the



socio-emotional development of students, including the formation of communication and interpersonal skills. The influence of gamification on the education of individuals with special educational needs is not studied enough. The study on this issue may be useful for the development of inclusive pedagogical approaches, directed and ensuring access to educational possibilities for all. It is necessary to study the long-term influence of gamification on students' development and education, as well as to determine the approaches that can influence further career and professional development. Table 1 presents a summary of the studies.

**Table 1.**  
*Generalisation of research*

The authors	Year	The main topic	Methods	Main conclusions	Limitation
Kryshtanovych, Kryshtanovych, Stepanenko, Brodiuk, Fast	2021	Development of creative thinking among students of creative professions	Systematic approach, empirical methods	Determination of factors affecting the development of creative thinking (education, environment, learning style)	Focus on short-term effects, lack of long-term analysis
Samodumska, Zarishniak, Tarasenko, Buchatska, Budas, Tregubenko	2022	The use of gamification in non-formal education of adults	Analysis of gamification practices	Increasing the motivation and effectiveness of adult learning	Insufficient attention to social-emotional development
Sadovets, Martynyuk, Orlovska, Lysak, Korol, Zembytska	2022	Gamification in conditions of digital transformation of education	Research on the impact of gamification	Increasing the effectiveness of education in higher educational institutions	Lack of consideration of cultural and socio-economic contexts
Duggal, Gupta, Singh	2021	Gamification and machine learning to improve education	Overview of methods, machine learning	Increasing attention and retention and educational results	Focusing on technological aspects, little consideration of the human factor
Alahmari et al.	2023	Review of literature on gamification in education	A systematic literature review	Identifying trends and gaps in gamification research	Review work does not contain new empirical data
Montiel-Ruiz, Sánchez-Vera, Solano-Fernández	2023	Social networks and gamification in physical education	Case analysis	Improvement of student interaction, improvement of physical development	Focus on one case, limited generality
Kurbonova	2023	Principles of gamification in education	Theoretical study	Increasing student interest and motivation, promoting academic integrity	Theoretical nature, lack of empirical data
Chizhikova	2023	Gamification and educational autonomy of students	Analysis of the influence of gamification	Promotion of independence and initiative of students	Insufficient empirical justification
Vaslenko, Vasenko	2023	The impact of gamification in higher education	Materials of the conference	Analysis of technological, economic and	Review nature, insufficient empirical support

			technical aspects of gamification			
Trischuk, Volyk	Figol, 2020	Effectiveness of gamification in electronic media	of User attention in research	Increasing interaction and audience participation	and	Focus on media, limited applicability to education

Source: Developed by the authors

Previous research has made a significant contribution to the understanding of various aspects of gamification in education and the development of creative thinking. They emphasise the importance of a systematic approach and empirical methods for the analysis of factors affecting the educational process. However, there are several limitations that require further investigation. In particular, most works focus on short-term effects and do not take into account the long-term impact of gamification on the development of students and their career prospects. Also, insufficient attention is paid to the socio-emotional development of students, especially the impact of gamification on communication and interpersonal skills. In addition, few studies focus on the inclusive aspects of gamification, which limits the possibility of developing inclusive pedagogical approaches.

The analysis of the literature indicates a growing interest in gamification in education, particularly in higher and non-formal education. There is a trend toward integrating gamification with other technologies, such as machine learning and social media, to improve educational outcomes. Many studies focus on increasing student motivation and the effectiveness of the learning process through gamification. However, there are important gaps that require further research. In particular, there is a lack of long-term studies evaluating the impact of gamification on the development of students and their professional trajectories.

The current study makes a unique contribution to the field of gamification in education by focusing on the analysis of its impact on the socio-emotional development of students. It considers how gamification can contribute to the development of communication and interpersonal skills, which is important for the formation of complex competencies in modern conditions. This study also highlights the importance of inclusive approaches by examining the impact of gamification on students with special educational needs. Thus, it fills a significant gap in existing research and offers new perspectives for further scientific developments.

## Methodology

### Research design

The effectiveness of this study is determined and evaluated by both quantitative and qualitative parameters. They are measured during the process of observation, and further they are compared and analysed. Further interpretation of the received data is conducted. The study was conducted in several stages, presented in Table 2.



**Table 2.**

*The stages of the study of gamification of the formation of the preparedness of students of higher educational institutions for self-realisation*

No.	Stage	Period of conduction	Content of the stage of the study
1.	Ascertaining	February, 2023	Determination of the aim and tasks of the study. Formation of control and experimental groups from the number of students. Selection of the instruments and methods of the study.
2.	Forming	March, 2023 - December, 2023	Realisation of pedagogical conditions with the use of gamification (for the experimental group) and traditional methods of teaching (for the control group). Study of the main components of motivation and academic achievements of students <i>Statistical processing of received results</i> Formation of study conclusions on the basis of received results
3.	Concluding	January, 2024	Study procedure. Summarising the results.

Source: Developed by the authors

## Participants

The experiment was conducted in the Department of Humanities, Danube Institute of National University 'Odesa Maritime Academy' and Rivne Lyceum Center of Hope. Experimental groups involved 100 students, and control groups – also 100 students, at the age of 18-20 years. The study of self-realisation of students under the influence of pedagogical conditions of experimental educational technology gamification was conducted during one year. 2nd-4th-year students of all specialities participated in the experimental works. Such sampling enabled the conduction of a reliable study of the influence of gamification on the formation of students' preparedness for self-realisation. A group of experts in the amount of 20 persons from the lecturers of the Department of Humanities and Rivne Lyceum Center of Hope were engaged.

## Instruments

Google Forms were used for the survey. Data entry and processing were made with the use of 'Microsoft Excel' and 'SPSS Statistics 19.0' software. All the data were presented in absolute (the number of response choices) and relative (% of the number of respondents) values.

## Data collection

1. *The Mehrabian Achievement Scales* adapted to the task of the study were used to determine the level of formation of students' motivation to professional training as part of professional identity (<http://personal.in.ua/article.php?id=470>). For this test, Cronbach's alpha amounts to 0,78 which is quite a high reliability parameter for pedagogical studies.
2. *Determination of the efficiency of the influence of gamification on educational process efficiency.* As educational processes are the evaluation acts, they should be studied and evaluated in detail with the use of criteria. A criterion is a feature based on which something is evaluated, determined, or classified. Being not a grade, the criterion serves as an efficiency metre. A criterion can be used as the basis for evaluation of the effectiveness of the educational process, particularly the results of its realisation. The term 'efficiency of education' belongs to the ground of relative non-measurable parameters, which describe the relation between the features of the quality of education (effectiveness) and the time needed to achieve a certain level of preparation.
3. *Method of expert evaluations.* Verification of the results of the received data was conducted using this method. It also enabled the conduction of a detailed analysis of the efficiency of the use of gamification devices in the educational process.





The use of Mehrabian's achievement scales provides an accurate measure of student motivation, but may be subjective due to self-reporting. Evaluating the effectiveness of gamification in the educational process allows for a comprehensive analysis, but it is difficult to measure intangible parameters. The method of expert evaluations provides verification of results and in-depth analysis, but can be subjective and depend on the chosen expert. The combination of these methods makes it possible to obtain more objective results of research on gamification in education.

Limitations of using Mehrabian's achievement scales may include the subjectivity of student responses and possible changes in test content during its adaptation. Evaluation of the effectiveness of gamification in education is limited by the complexity of measuring intangible parameters. The method of expert evaluations can be subjective and depends on the chosen expert, which can affect the objectivity of the results.

### Analysis of data

1. To determine the standard deviation (C) for each group, the following formula was used:

$$S = \sqrt{\frac{\sum(X_i - \bar{X})^2}{N-1}}; \quad (1)$$

where  $X_i$  - the value of each level of formation of the value-motivational component,  $\bar{X}$  - the average value of the levels of formation of value-motivational components, and  $N$  - is the number of observations (in this situation, the number of students in each group).

2. Criterion  $\chi^2$  is calculated according to the formula:

$$\chi^2 = N \cdot [\sum_{j=1}^m \left( \sum_{i=1}^n \frac{x_{ij}^2}{Q_i \cdot R_j} \right) - 1], \quad (2)$$

where  $N$  - is the total number of students, participating in the forming stage of the pedagogical experiment,  $m$  - the number of possible values of the first feature,  $n$  - the number of possible values of the second feature;

$x_{ij}$  - number of combinations of  $i$  value of the first feature with  $j$  value of the second feature;

$Q_i$  - the total number of observations of  $i$  value of the first feature;

$R_j$  - the total number of observations of  $j$  value of the second feature.

Critical values, as a rule, are presented on different significance levels. Error probability, related to deviation or refutation of the null hypothesis, is called significance level. Thus, the probability of significance of differences regardless of their accidental nature is called the significance level. Significance level (marked as  $\alpha$ ), with the value 0,05 is used in pedagogical studies, denoting that error probability cannot exceed 5%. The study uses this significance level.

3. The reliability of the selected methods was checked with Cronbach's alpha. It characterises the internal consistency of test tasks and is calculated according to the formula:

$$\frac{N}{N-1} \left( \frac{\sigma_x^2 - \sum_{i=1}^N \sigma_{Y_i}^2}{\sigma_x^2} \right), \quad (3)$$

where  $\sigma_x^2$  - dispersion of the grade of the whole test;

$\sigma_{Y_i}^2$  - element  $i$  dispersion.



## Ethical criteria

Principles of academic honesty and respect for an individual lie in the basis of this study. The study has an exclusively scientific nature and excludes discreditation. The main criteria for the selection of the instruments and methods were checked for credibility, reliability, verification of the received results, and professionalism. They gave informed consent to their personal data processing and publication of study results. Each participant of the study was conferred a code, to assure that it is unbiased and objective.

## Results

The results of the conducted study show that the motivational tendency - strive to for success prevailed in most participants, while the motive of failure prevention prevailed in a minor part (Table 3). This was found using cumulative grades, received according to standard methodology.

**Table 3.**

*The level of formation of motivation to professional training of students of experimental and control groups on the ascertaining stage (in percentage)*

Groups/levels	Strive to success, %	Failure prevention, %
<i>Experimental</i>	57	43
<i>Control</i>	58	42

Source: Developed by the authors on the basis of the study results

It is necessary to note that parameter values are very similar in the table 4. This allows at the ascertaining stage both in the experimental and control groups to ascertain the homogeneity of the initial conditions, which guarantees the validity and transparency of the experiment.

**Table 4.**

*The level of formation of the value-motivational component in experimental and control groups on the ascertaining stage (in percentage)*

Groups/levels	High, %	Average, %	Low, %
Experimental	67	33	Not found
Control	60	40	

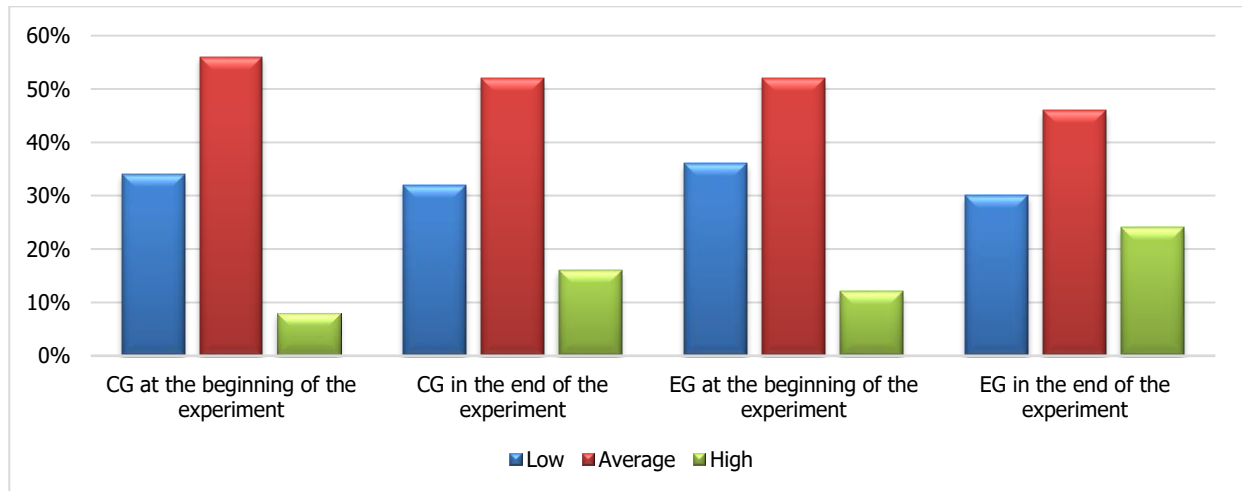
Source: Developed by the authors on the basis of the study results

The standard deviation (C) for each group was defined to ensure the objectivity and reliability of the received results. Such deviation indicates the level of deviation of each parameter from the average value. Determination of standard deviation is important for further results interpretation and determination of the level of data variability. In this study, (C) indicates the level of value distribution in relation to the average value. In the case of the experimental group, it is equal to 20,083, which indicates the large variability in results. On the other side, the (C) value for the control group amounts to 14,142, which indicates lower variability in the value-motivational component of the professional identity.

Table 3 demonstrates that students did not have low values of the level of formation of value-motivational components of professional identity. This means that students in both groups were equally interested in education, and only the experiment can demonstrate the efficiency of educational programs.

The ordinal scale was developed to analyse the results of the measurement of the knowledge level. For this, three levels of knowledge were determined (L=3): satisfactory (the number of solved tasks is less or

equal to 12), good (the number of solver tasks is more than 12, but less or equal to 15), and high (the number of solved tasks is significantly higher than 15). After this, the results were aggregated into selected frequency levels. Data in Fig. 1 demonstrate, that before the beginning of the experiment, the control group had 34% of participants, who received a grade, which corresponded to a certain range:  $m_1=34$ , which means that 34% of students of the control group before the beginning of the experiment demonstrated a sufficient level of this competence formation),  $m_2=56$ ,  $m_3=8$ . Fig. 1 demonstrates the division of participants into experimental and control groups according to their knowledge level.



**Figure 1.** Results of measurement of the level of knowledge in control and experimental groups before and after the experiment.

**Source:** Developed by the authors on the basis of the study results.

According to the diagram, the low level of knowledge has reduced in the experimental group after the introduction of new conditions. On the other side, the high level has increased. The parameters of the control group have significantly changed. After the end of the experiment, the average number of correctly solved tasks for the experimental and control groups was determined to evaluate study results in quantity. Thus, experiment results showed that students of the experimental group correctly performed final tests for 2,66 more than those of the control group, and in general, the number of correctly performed tasks in the experimental group was lower for 1,76.

The table of critical values shows a critical value  $\chi^2$  for the significance level of 0,05, and the value  $L=3$  is equal to 7,82. Calculated  $L=3$ , thus, there were three levels of knowledge: satisfactory, good, and excellent. Thus,  $L-1=2$ . From the table of critical values of criterion 2 for the significance level of  $\alpha=0,05$ , we receive  $L-1=2$ :  $\chi^2_{0,05} = 5,99$ . Calculation results showed that all empirical values of criterion 2 are lower than the critical value except for the result  $\chi^2_{EMP} = 6,10$  for comparison of experimental and control groups after the end of the experiment. Table 5 presents these values.

**Table 5.**  
*Empirical values of  $\chi^2$  criterion*

	CG before the beginning of the experiment	EG before the beginning of the experiment	CG after the end of the experiment	EG after the end of the experiment
CG before the beginning of the experiment	0	0,4	0,13	4,64
EG before the beginning of the experiment	0,4	0	0,04	5,99
CG after the end of the experiment	0,13	0,04	0	6,10
EG after the end of the experiment	4,64	5,99	6,10	0

Source: Developed by the authors on the basis of the study results.

Based on the data presented in Table 4, it is possible to conclude that the characteristics of all compared samples, except for control and experimental groups after the end of the experiment, are equal to the significance level of 0,05. As  $\chi^2_{EMT} = 6,10 > 5,99 = \chi^2_{0,05}$ , 'the reliability of differences of characteristics of experimental and control groups after the end of the experiment is 95%'. Thus, the states of the control and experimental groups are similar at the beginning of the experiment and differ in the end.

Ensuring the validity of the study is an important part, besides the use of the above-presented mathematical methods for the analysis of the study results. We understand validity as the correctness and appropriateness of the methods and results of the study for use in particular conditions. Content, constructive, and criteria validity are different. Content validity defines the level to which the content of the task technique corresponds to real activity, in which they are measured. This means that students see a clear relation between the content of the procedure of evaluation of features peculiarities and the formed plan of discipline studying, provided by the detailed commentaries, which are based on psychological diagnostics techniques.

## Discussion

According to Korolko and Pereghinets (2023), and Sagan (2023), engagement in the process and enhancement of internal motivation of students is the basic purpose of gamification, that is achieved due to natural satisfaction and absence of forcing. Therefore, using game mechanisms, gaming elements and the formation of gaming thinking, it is possible to achieve engagement and create educational environments, forming new experiences and new methods of problem-solving.

In general, gamification creates and maintains interest, and increases loyalty, efficiency, and resultativeness of the users and/or consumers. But Murillo-Zamorano, López-Sánchez, López-Rey and Bueno-Muñoz (2023) note that it works in short-term perspective or at high level of engagement in the process without gamification, and even if it allows receiving the necessary result at the beginning, the activity rapidly decreases soon, and the element of external forcing becomes self-obvious. In other words, extremely high expectations are related to the notion of gamification as an innovative and very effective approach, which is not proven in general.

According to Oliveira et al. (2023) and Goi (2023), the disadvantages of this technology are related to its marketing strategy, due to which it provides for manipulation and forcing, which rather demotivates than motivates to continue the activity. The use of gamification of different types of processes at some stage



causes overuse and fatigue from the game, which requires either expansion of the use of gaming elements or objection to the game and activity transition to another qualitative level. This leads to the reduction of motivation to activity, but the strengthening of the gaming component of the process cannot last endlessly, and the transition of the activity from gaming form to non-gaming form causes frustration.

Klock, Gasparini, Pimenta and Hamari (2020) and Camacho-Sánchez, Manzano-León, Rodríguez-Ferrer, Serna and Lavega-Burgués (2023) believe that gamification should be considered as the instrument for enhancing educational process efficiency. It is necessary to know how to use this instrument, to be competitive in the world market. Therefore, the methodology of gamification of educational disciplines, which would include the development of gamification and integral game educational components, is needed. Such a combination is based on the experience of the use of integral games in domestic educational practice.

The influence of the methodology introduction has both positive and negative features. Based on the results of the conducted study, the use of the methodology of gamification of educational disciplines improves students' engagement in the educational process and enhances interest in the theme or discipline (Zhukova et al., 2023). On the other side, its application can lead to negative consequences described in the first section (Afifi et al., 2022). In particular, demotivation can develop in case of excessive use of external motivational elements, such as motivation with grades and badges, which reduce internal students' motivation.

The study has found both theoretical and practical conclusions, which significantly contributed to the understanding of the level of formation of the value-motivational part of the professional identity of future translators in the ascertaining stage. The theoretical conclusions of the study demonstrated important relations between the levels of the value component and factors, affecting its formation in students, who learn to translate. The main elements, influencing the development of this identity part, were defined by the analysis of the comparison of data of experimental and control groups. The practical results include the development of particular methods and methods that can be used in the educational process for effective development of the value element. The received information can be used for the development of new products and methods oriented on the optimisation of the process of formation of the professional identity of translators.

Several methodological limitations, which should be considered in the received results' interpretation, were found. First, it is necessary to underline that the study was conducted with the engagement of a limited sample of students of a certain higher educational institution, which can limit the generalisation of the received results and the universality of their use in other educational contexts. Second, it is important to pay attention to the fact that the study was long-term, and the length of student's interaction with the gamified educational environment was limited. Such a factor can influence the stability and length of gamification effects, therefore, received results should be considered as intermediate and perceived within the context of the selected time limit.

## Conclusions

*Relevance.* The study and analysis of the possibilities of gamification within the context of distance education enable considering this approach as a powerful tool for the enhancement of the educational process. The indicated results confirm the importance of improvement of online education and the provision of students with effective means for self-development. *Conclusions on the received results.* It is possible to note that in distance education, gamification of the educational process becomes a perspective and effective approach oriented on the enhancement of students' motivation and activity. Gamification stimulates students and contributes to their active and goal-oriented engagement in the educational process. When considering sources of bias, it is important to consider the diversity of the student population



and their personal characteristics to avoid generalizations that may not apply to all groups. *Implication.* The received results may be used in the sphere of higher education and distance learning. The introduction of gamification elements into the educational process enables optimisation of the approaches to education and improving education quality. This will be, firstly, important for the lecturers and managers of educational institutions, as well as for the developers of pedagogical software and online platforms. It is recommended that when developing educational programs, consider the possibility of implementing such gamification elements as quizzes, success ratings, and virtualization of educational material as a variation component of the curriculum. *Further studies perspectives.* Further studies can be dedicated to the search and testing of the new gamification strategies and elements, specially adapted to the needs of specific discipline areas or groups of students. It is important to conduct research on the effectiveness of gamification in different contexts, such as subject areas or age groups of respondents. It should be investigated whether these factors influence the effectiveness of introducing gamification elements. This will allow a better understanding of which methods are most effective in specific situations and how they can be optimized to improve the learning process.

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