Check for updates

DOI: https://doi.org/10.34069/AI/2024.73.01.28

How to Cite:
Folomieieva, N., Pelekh, V., Haidamashko, I., Sivak, N., & Koriakin, O. (2024). Gamification in the educational process of higher education institutions. *Amazonia Investiga*, *13*(73), 331-343. https://doi.org/10.34069/AI/2024.73.01.28

Gamification in the educational process of higher education institutions

Гейміфікація в освітньому процесі закладів вищої освіти

Received: December 14, 2023 Accepted: January 27, 2024

Written by:
Nataliia Folomieieva[1]
https://orcid.org/0000-0002-7832-4748
Vladyslav Pelekh[2]
https://orcid.org/0009-0004-4049-4567
Iryna Haidamashko[3]
https://orcid.org/0000-0001-6655-6640
Nataliia Sivak[4]
https://orcid.org/0000-0003-2605-1781
Oleksii Koriakin[5]
https://orcid.org/0000-0002-3084-8796

Abstract

The article theoretically reveals the content of the terminological apparatus of gamification. The purpose of the article is the need to introduce and study the most effective ways of introducing gamification into the educational process of higher educational institutions for the preparation of a competitive young generation. The methodological concept reflects the relationship and interaction of the use of gamification methods in the educational process of higher education institutions, in particular the use of various components (motivational, meaningful, active, and reflective components). The results show the main directions of influence and structural elements of gamification; the main areas of influence of gamification on the educational environment are clarified; six steps of game mechanisms for introducing gamification into the educational space are described; the importance of implementation, negative manifestations of gamification for the educational process are shown, and the main aspects of gamification are revealed. The most

Анотація

У статті теоретично розкрито зміст термінологічного апарату гейміфікації. Метою статті є необхідність впровадження та вивчення найбільш ефективних шляхів впровадження гейміфікації у навчальний процес вищих навчальних закладів для підготовки конкурентоспроможного молодого покоління. Методологічний концепт відображає взаємозв'язок і взаємодію використання шляхів гейміфікації в освітньому процесі закладів вищої освіти, зокрема використання різних компонентів (мотиваційний, змістовний, діяльнісний і рефлексивний компоненти). У результатах показано основні напрями впливу та структурні елементи гейміфікації; з'ясовано основні напрями впливу гейміфікації на освітнє середовище; розписано шість кроків ігрових механізмів з упровадження гейміфікації в освітній простір; показано значущість впровадження, негативні прояви гейміфікації для освітнього процесу та розкрито основні аспекти гейміфікації. Виписано найдієвіші особливості гейміфікації для

[1] Candidate of Pedagogical Sciences, Associate Professor of the Department of Stage & Variety Art, and Directing Techniques, Sumy State Pedagogical University named after A.S. Makarenko, Ukraine. WoS Researcher ID: JUU-7235-2023
[2] Ph.D. Student at the Institute of Pedagogy, National Academy of Educational Sciences of Ukraine, Ukraine. WoS Researcher ID: JOK-9057-2023
[3] Candidate of Pedagogical Sciences, Associate Professor, Associate Professor of the Department of Pedagogy, Khmelnytskyi Humanitarian-Pedagogical Academy, Ukraine. WoS Researcher ID: JUV-5221-2023
[4] Candidate Of Pedagogic Sciences, Associate Professor, Associate Professor of the Department of Pedagogy, Khmelnytskyi Humanitarian-Pedagogical Academy, Ukraine. WoS Researcher ID: JUV-5267-2023
[5] Candidate of Pedagogical Sciences, Head of the Department of Stage & Variety Art, and Directing Techniques, Sumy State Pedagogical University named after A.S. Makarenko, Ukraine. WoS Researcher ID: JQW-1756-2023

effective features of gamification for students of higher education are listed and examples of Internet projects using gamification in the educational space are given. The introduction of gamification methods through the use of models is substantiated. An experimental study was conducted to check the formation of professional competence in future specialists by providing an educational gamified system in higher education institutions.

Keywords: gamification, professional competence, education, gamified system in institutions of higher education, students of higher education.

здобувачів вищої освіти та наведено приклади проектів у мережі Internet із використанням в освітньому просторі гейміфікації. Обгрунтовано впровадження методів гейміфікації шляхом використання моделей. Проведено експериментальне дослідження з метою перевірки сформованості професійної компетентності у майбутніх фахівців шляхом забезпечення освітньої гейміфікованої системи у закладах вищої освіти.

Ключові слова: гейміфікація, професійна компетентність, освіта, гейміфікована система у закладах вищої освіти, здобувачі вищої освіти.

Introduction

Nowadays, gamification has a significant impact on the life of every person. From the screen of a laptop, smartphone, or computer, we are constantly and continuously affected by a huge flow of information that can be modified and this allows us to use game elements as a potential incentive for the self-development of each individual. The market of gamified technologies is actively developing all over the world, thereby attracting a new audience to education and self-education. In institutions of higher education, game technologies are actively implemented, making the educational process interesting and effective in the work of students of higher education. With the help of gamification, personal motivation becomes the most effective way of interaction for each person, in particular, and large corporations, in general. The higher education system is actively moving to a training model from an academic lecture model (Trishchuk et al., 2019).

At the heart of gamification is the idea of using a game approach to make teaching and learning more interesting and effective.

The real value of gamification is that the game principle contributes to the creation of a meaningful learning experience, which is necessary for the training of a competent specialist.

The abundance of computer equipment and the availability of high-speed access to the global Internet network made it possible to widely use digital didactic tools, global information resources, and educational Internet services in the educational process, which created conditions for improving the educational process and increasing its quality and effectiveness. However, the realities testify to the lack of a proper return from the technical modernization of educational institutions: in mass pedagogical practice, the predominant use of traditional methods is observed; the pace and level of mastering of the latest pedagogical tools by teachers do not meet the requirements of a modern digital school; the educational process is not adapted to the needs and expectations of modern students who live in the world of the Internet and gadgets.

The determining factor in solving the outlined problem is the improvement of the system of professional training of personnel in the direction of ensuring their ability to creatively and productively use the powerful educational potential of innovative digital technologies. From the point of view of the training of specialists, the possession of modern technologies comes to the fore.

In the modern educational situation, there are several contradictions between:

- the growing influence of information resources on the development of education and the lag of theoretical and methodical research on their systematic use in the educational process;
- the significant didactic potential of the informational educational environment and the lack of theoretically grounded models and effective methods of using gamification in educational institutions;
- the growing demands of society for the organization of the educational process and the low level of use of ICT tools;
- the presence of a significant amount of software, teaching-methodical and didactic support for the educational process, and the lack of universal access to it;
- the significant technological potential of the informational educational environment and the low educational mobility of participants in the educational process;

– intensive development of ICT and the speed of updating the content of educational programs, which ensure the formation of IC competence for educational communication, cooperation, cooperative work.

In the article, we considered: the content of the terminological apparatus of gamification; the main directions of influence and structural elements of gamification; six steps of game mechanisms for introducing gamification into the educational space; the importance of implementation, negative manifestations of gamification for the educational process and the main aspects of gamification; the most effective features of gamification for students of higher education; examples of Internet projects using gamification in the educational space; introduction of gamification methods through the use of models; experimental verification of the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education.

However, despite a significant amount of research, the problem of using gamification in the educational process of a higher school has not yet been fully explored, further research is needed to provide theoretical and practical support for the implementation of the technology and its application methods. The insufficient development of aspects of this problem, and its relevance determined the choice of the topic of the article.

Literature review

In recent years, interest in education has increased significantly, and teachers increasingly turn to the services of the Internet to use ICT for communication, cooperation, and work organization, and the rapid development of Internet resources, in particular gamification, has become a leading trend in solving the problems of educational mobility of all participants of the educational process.

The psychological-pedagogical analysis of the research made it possible to analyze and show the advantages of the gamification process in the professional development of students of higher education of various specialties, to reveal its role in the educational environment of higher education institutions. In particular, O. Trischuk, N. Fihol, & N. Volyk (2019) structured the stages of gamification development; revealed gamification as a scientific term, as a social and cultural phenomenon; developed a method of analyzing the effectiveness of gamified materials; proposed criteria for the uniqueness of gamification tools. O. Karabin (2019) also presented gamification as a social and cultural phenomenon. The need to implement the hemification process in education to form professional competencies and practical skills is shown; formation of positive motivation to consolidate and master new professional material; the inherent influence of game technologies on the educational process of education seekers; awakening a sense of self-sufficiency of the individual, forming creative thinking, improving his mental abilities, mastering the skills of the cognitive process, developing critical thinking skills. In the form of a pyramid by levels, the scientist considered the structural elements of gamification and identified the main components of game activity at various stages of educational activity, characterized game mechanisms, and showed their content.

Scientists emphasize that the introduction of ICT into the educational process and its digitalization allows to implementation of a new format of education. Gamification is considered by modern scientists as a component of the educational environment and acts as a complex, multifaceted entity. At the same time, the analysis of scientific sources on the topic of the study proved the absence of works devoted to the comprehensive study of the problems of the organization of the information environment, in particular its organizational mechanisms, as well as the involvement of pedagogical workers of educational institutions in the processes of ensuring the quality of the training of specialists using the capabilities of the information environment.

As an innovative and promising means of increasing the foreign language competence of higher education students, the study of the gamification process during independent, remote, classroom work by O. Pasichnyk (2018) is presented. To create interactive quests, professionally oriented games, and quizzes based on educational platforms, the possibilities of integrating such various educational platforms in the educational process of a higher school were considered.

O. Zhernovnykova et al., (2020) devoted their research to the formation of digital competence of future teachers using gamification. The researchers revealed the essence of the concepts of "digital competence", "digital training of the future teacher", and "gamification of education". It has been proven that the formation of digital competence of future specialists using

gamification is one of the factors that contribute to the effective development of the entire educational process in a modern institution of higher education since gamification in education is a new ideology based on the "digitalization" of education, in which coordinators of educational trajectories and online platforms replace traditional teachers. The authors developed and theoretically substantiated the technology of forming the digital competence of future specialists using gamification, while the following mobile applications were chosen: ClassDojo, DuoLingo, Brainscape, Coursera, and Socrative.

The didactic properties of the use of electronic educational resources in general educational institutions are summarized by M. Imeridze, I. Bykov, & D. Velychko (2020). They analyzed the process of gamification in the professional development of students of various undergraduate majors, which are innovations in the process of professional development of students. The importance of computer games has been proven, which allows for the creation of new educational practices; new forms of professional training and education are proposed. Gamification is presented as "the application of game elements and game principles in non-game contexts to achieve real educational goals while studying an educational subject".

With the continuous development of ICT comes opportunities for widespread access to electronic educational resources, which is an urgent issue for domestic general educational institutions, but this problem is not fully disclosed in scientific works.

Many foreign scientists pay attention to the need to explore gamification in the educational process. In particular, V. Malvasi & D. Recio-Moreno (2022) emphasize that gamification is projected as a challenge for innovation in the educational context. In recent years, game-based learning proposals have been developed to facilitate the learning of the learning content of the subjects. This study aims to diagnose the level of application of gamification as a learning strategy in the field of mathematics based on the perception of secondary school teachers and students. In turn, the authors K.Werbach & D. Hunter (2015) note that gamification is one of the effective ways to solve the problem in education. However, there is still a lack of systematic understanding and effective use of gamification due to the diversity of gamification functions. More importantly, most gamification feature classification methods fail to provide practice guidance. In their study, a new model (SMART) was proposed for the classification of gamification functions.

So, our psychological and pedagogical analysis of research showed that gamification is a process that contributes to the transformation of the educational process into a game and ensures the use of the dynamics of games and game thinking to attract students of higher education to solve educational tasks. Research shows that one of the main methods of organizing education is gamification. At the same time, the analysis of scientific research on the specified problem provides grounds for asserting that gamification in the educational process of higher education institutions was not the subject of detailed scientific research.

It should be noted that despite the presence of a large number of sources that consider the theoretical and practical aspects of the use of gamification in the educational process, their use remains limited, which is caused, first of all, by the lack of proper preparation of teachers for such activities in psychological, pedagogical, methodological and technological aspects. At the same time, there is a lack of research focused on the highlighted entities, the theoretical and methodological foundations of training specialists to use gamification technologies in the educational process, and the issues of didactic and methodological support for the said training remain problematic.

According to this purpose of the study is a need to implement and study the most effective ways of introducing gamification into the educational process of higher education institutions to prepare a competitive young generation. To conduct an experimental study to check the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education.

Methodology

The methodological concept reflects the relationship and interaction of the use of gamification methods in the educational process of higher education institutions, in particular the use of various components (motivational, meaningful, activity, and reflective components). In the process of the conducted research, a set of methods was used to ensure the achievement of the goal, namely: theoretical: conducting a systematic analysis of research and scientific literature to clarify the different approaches of scientists to the concept of gamification in the

educational process of higher education institutions, comparing different views on the problem under study, analysis of works on improving the organization of the educational process, analyzing the training of future specialists and researching pedagogical experience; empirical: application of methods: conversations, observations, surveys, questionnaires to find out the features of the gamification of the educational process of universities in the process of professional training of specialists; conducting a pedagogical experiment to collect data on the effectiveness of gamification in the educational process of universities; experimental research base: experimental research was conducted during 2022-2023. A total of 86 students from higher education institutions took part in the experiment (45 in the control group and 41 in the experimental group).

Optimal research methods were chosen based on such factors as the field of science, the availability of raw data for analysis, and the amount of material.

The research is quantitative. The purpose of this is to measure and analyze numerical data to test effective pathways, identify patterns, and make predictions. Our research includes an experiment.

The implementation of the pedagogical experiment was carried out in three stages: preparatory, main, and final.

At the preparatory stage, the purpose and tasks of the research were determined, the experimental plan was developed, methods of measurement and processing of results were selected, control and experimental groups were selected, and their homogeneity was checked.

At the main stage, an experiment was conducted. At the final stage, the results of the experiment were analyzed, their reliability was confirmed, and conclusions were drawn about the pedagogical effect of the experiment. The experiment was conducted at several universities: A.S. Makarenko Sumy State Pedagogical University, and Khmelnytskyi Humanitarian-Pedagogical Academy. Permission to experiment was approved by the academic councils of these universities and considered by the ethics.

The reliability and validity of the obtained results, and the objectivity of their assessment were ensured by the methodological soundness of the initial positions and the qualitative mechanism for evaluating the quality under study, the use of a complex of complementary research methods, and the involvement of a group of respondents from a higher educational institution in the analysis of its results.

To assess the homogeneity of experimental and control data, statistical processing was performed using MS Excel and SPSS (Statistical Package for Social Science).

When determining the sample of subjects, the general specificity of the subject of the study was taken into account. The total sample size was 86 subjects. When forming the sample, the criteria of meaningfulness, representativeness, and equivalence were taken into account. The sample was formed by random selection using the technical procedure for calculating the selection step.

The results of the experimental study confirmed the applicability, optimality, and effectiveness of the proposed pedagogical conditions for the formation of an environmental culture of an ecologist in the process of professional training.
We conducted an experimental study to check the formation of professional competence in future specialists by providing an educational gamified system in higher education institutions, which ensures interest in professional activity, stimulates the creative expression of a specialist in professional activity, and directs his need to acquire competitive knowledge.

Results and discussion

1. Content of the terminological apparatus of gamification.

The term "gamification" was coined by the British video game developer Nick Pelling, who used it in his own development in 2002. At the same time, the inclusion of game elements in educational technologies in Western institutions of higher education gained wide popularity in 2010 and began in 2008. At this time, gamification has spread in professional activity, the education system, in all spheres of human life.

Gamification is considered a process of using the dynamics of games, game thinking to transform the educational process into a game, the introduction of game techniques, games, game practices with an educational purpose, the involvement of students of higher education in solving tasks, the activation of educational

activities throughout life (Karabin, 2019); this is the effective use of individual game elements in non-game situations when game elements are involved in real circumstances to motivate participants in the educational process for behavioral reactions or certain actions. The focus of process participants on a real goal distinguishes gamification from other game forms. With this approach, gamification is related to one's own activity, and the success of this method lies in the power of motivation for the educational space and learning (López Marí et al., 2022).

2. Main directions of influence and structural elements of gamification.

The phenomenon of gamification is inextricably linked to the field of education, today it is actively used in many areas of human activity, where it demonstrates its effectiveness as best as possible (Malvasi & Recio-Moreno, 2022).

Let's find out the main areas of influence of gamification on the educational environment:

1) psychology of decision-making;
2) implementation of motivational solutions;
3) further behavioral results (Trishchuk et al., 2019).

We will consider the structural elements of gamification at the following levels: principles of work (interaction, expectation of victory, feedback, and competition with game participants); gamification components (badges, awards, symbols, etc.); game dynamics (relationships between game participants, player progress, emotions).

Elements of gamification can be applied at various stages of educational activity: a complete lesson; multiple use; and structural elements of the lesson.

Allowance for mistakes is a great feature of gamification. Therefore, with such an approach, students feel free, they are not afraid of punishment and condemnation for mistakes, their fear of wrong actions disappears and fear is replaced by confidence and initiative. This allows higher education students to independently choose options for action in the educational process. This forms a sense of responsibility for their own actions and encourages them to be active.

3. Six steps of game mechanisms for introducing gamification into the educational space.

To successfully implement gamification, it is worth using the instructions for building a game system by the main experts in the field of gamification, Kevin Werbach and Dan Hunter, who developed six steps of game mechanisms for introducing gamification into the educational space.

Step 1: Setting gamification goals. Goals should correspond to the acronym SMART (Specific Measurable Achievable Relevant Time-bound) and should be: relevant; achievable; measurable; specific; and time-bound. Gamification tasks should, according to each element of the system, be guided by the set goals and contain the specified characteristics.

Step 2: target determination of the behavior of those seeking higher education. For each of the participants of the gamification system, the behavior should be thought out. To further design the system, it is necessary to describe all the chains of actions of each of the players (students of higher education). At this stage, it is worth giving answers to the following questions: How does such an approach in education contribute to the achievement of the set goal? What should players (graduates) do? How does feedback work? How do we measure it?

Step 3: Perform the description of players (higher education students). The images of players (students of higher education) must be clearly defined. At each of the stages, it is mandatory to define the description of different types of players (students of higher education), with a well-thought-out motivation for performing their actions.

Step 4: development of structural elements of the gamification system. The structure of the game system has the following levels (according to K. Werbach & D. Hunter (2015)):

– micro-level – "cycles of involvement in the educational space". These are "motivation to action – action – feedback" chains. Performing an action, motivating the player (higher education student) to act, receiving feedback from the system (rewards, etc., which is the system's reaction to the higher education student's actions). At the feedback stage, students of higher education are encouraged to take the next action (calls to

action, motivation management techniques, etc.);
- macro-level – "the player's journey to gain new knowledge", this is the phasing of tasks according to a pre-developed scenario; presenting an exciting story on which the gamification system is based.

Step 5: Provide players (students of higher education) with a sense of success and satisfaction with the implementation of gamification mechanisms. Gaming activities of students of higher education should bring pleasure and a sense of joy. The game process itself should be fun, and a pleasant activity (Vergara et al., 2023).

Step 6: selection of tools by students of higher education. The use of information technologies for the game system, the implementation of the gamification process by using electronic and digital devices, gadgets, cloud technologies, and mobile applications prepared at the previous stages of the educational process (Liashenko, 2017).

4. Significance of implementation, negative manifestations of gamification for the educational process, and main aspects of gamification.

Implementation of gamification:

- develops mental skills of students of higher education, promotes students' motivation for the educational process in a higher education institution;
- develops a person's spatial imagination and reaction to the promotion of new material;
- encourages students of higher education to work in an interactive environment;
- promotes the organization of independent work of students of higher education;
- forms practical work skills and abilities of students in groups with consolidation of educational material, etc.

We note the shortcomings of the implementation of gamification in the educational process, in particular:

- imperfect implementation of game techniques;
- misunderstanding of the tasks and goals of the educational process;
- the presence of a deficit in communication during the educational process;
- improvement of training of teachers in the use of tools and information technologies;
- the presence of time costs associated with the implementation and development of gaming activities (Karabin, 2019).

Let's name the main aspects of gamification:

1) dynamics – the use of scenarios to focus the user's attention and his reaction in real time;
2) mechanics – the use of scenario elements that are characteristic of the game process (status, virtual awards, virtual goods, points);
3) aesthetics – to promote emotional torture, creating a general gaming impression;
4) social interaction – a wide range of techniques that provide interaction between users (Sergeieva, 2014).

5. The most effective features of gamification for students of higher education.

Considering the impact of game methods in education, let's highlight the most effective features for students of higher education:

- quick, unlike traditional, feedback (higher education graduates immediately make the next decision, because they see the consequences of their actions);
- clear rules for achieving goals (the conditions for obtaining the required result in traditional education may change depending on the circumstances, be dynamic, and during gamification, such algorithms are used (they must be clear and unchanging), which are processed by computer technology);
- the plot of the game (attracting higher education students to a certain plot line, certain activities within the framework of a common goal, creates the effect of penetration, involvement in exactly such a story, which is played by the character);
- challenging tasks (those that can be solved, unlike life difficulties, but are sufficiently complex and divided into small, step-by-step, global tasks, which helps create a situation of success and increases interest in learning);
- the complication of tasks and goals, expansion and opening of access to educational content, and gradual change as students of higher education acquire new competencies of skills, manifested in the change of levels, obtaining points (obtaining a digital indication of the significance of the work done);

– conditional infinity of the game (the game continues until the player (student of higher education) becomes an expert.

Games used for educational purposes can be MMORPG (massively multiplayer online role-playing game) – online role-playing games with a large number of users; games alternative reality games (Alternative Reality Games) – an interactive story that uses game elements, objects of the real world; pervasive games (Pervasive games) – games where there is no clear boundary between the virtual fictional world and reality. When introducing games into educational activities applicants for higher education, the following points must be taken into account: there must be a rating system for each new level, a task (learning module), and a point system, each type of activity must be evaluated, and the evaluation system must start from 0; games can be influenced by outsiders and take place in the real world, that is, depending on the circumstances, certain conditions may be changed; human behavior is unpredictable, it cannot be programmed.

6. Examples of Internet projects using gamification in the educational space.

Today, there are many projects on the Internet using gamification in the educational space. Here are some examples:

– *Codecademy* – teaching programming in HTML, JavaScript, Ruby, Python (https://www.codecademy.com/);
– *Motion Math Games* – mobile math games make learning fun and make education exciting (https://motionmathgames.com/);
– *Code School* – a service with gamification elements for teaching programming (https://www.codeschool.com/courses);
– *Khanacademy* – free video courses on various subjects (https://www.khanacademy.org/);
– *Mathletics* – a program for the educational space of school education, aimed at strengthening mathematical skills through tasks and games that are difficult to complete (https://www.mathletics.eu/);
– *Foldit* – solving scientific tasks as puzzles (https://fold.it/portal/);
– *Spongelab* – an innovative platform for personalized scientific education (https://www.spongelab.com/);
– *Physicsgames* – interesting scientific games that require knowledge of physics (http://www.physicsgames.net/) (Bondarenko, 2017).

Video games and computer games, which are the basis of gamification, differ from other popular media because they are interactive and allow players (students of higher education) to act in different roles (inventor, scientist, political leader, traveler, etc.), to make choices and evaluate its consequences, set tasks (Pasichnyk, 2018).

Gamification is closer to traditional games than conventional educational games. Video games that are used to gamify the educational space of higher education are more complex than educational games. Educational games may not be included in gamified education at all.

The ClassCraft system is an example of a gamification tool – it is a free educational role-playing game in which the student and the teacher play during the educational process. It can be included in the teaching of any discipline, is the foundation and background for the game-based educational process, and is used to motivate students to education and interest them in the educational process of higher education. The real success of the student of higher education is reflected by the rewards and achievements received during the game. Performance analytics is integrated into the gamification system, which allows parents to receive information on the success of students. This system also encourages higher education seekers to cooperate, because it is they who help each other during the game and this allows getting additional points that add up to the overall score of those who actively help other education seekers (Arufe Giráldez et al., 2022).

Therefore, the ClassCraft system is flexible, individualizes the educational process, provides an accessible educational level for each student, encourages active cooperation, and allows you to spend less time tracking success. The difference from educational games of the ClassCraft system is that it does not just present educational material in a game form, but acts as a game basis for interaction between a student and a teacher, allowing to transform educational material into a game.

Game-Based Learning (GBL) is a form of education that is used to add entertainment to the educational process and to motivate learners to learn through the game to make learning more interesting. The involvement of video games in the educational process in a higher education institution occurs as an element of reward for the achieved educational result, as a simulation, as an educational example. The goal of GBL is to turn

the entire educational process into a game. This goal coincides with the goal of gamification, that is, the use of a video game as part of the educational process of a higher education institution. The common features are that both of these directions can successfully test certain models, test identities and roles in the game process, transfer values and information; and appeal to the emotions of the player (student of higher education), thanks to which the interaction is often more effective than a simple exchange of information; practicing skills in the game, similar to practicing them during training (Durmaz et al., 2022).

Using in education based on the game Minecraft: Education Edition. This is a version of the popular Minecraft game adapted specifically for the educational process and can be used for a better understanding of educational material, not just for fun. It is a kind of compromise between rewards for higher education achievers, full gamification of education, and educational games. Unfortunately, the transformation of the educational process into a video game and the use of video games in education has not gained significant popularity. We agree with the opinion of G. Frasca (2015), who notes that "games do not change the educational system as long as it is concerned with the fear of parents and the administration, and not with the needs of children.". For the full inclusion of games in the educational process and the application of the educational potential of video games in the educational space, not only technical tools should be used. An important direction is to work with educators and parents, who do not always see video games as an innovative and important tool for quality education (Horban, 2019).

7. Implementation of gamification methods through the use of models.

In the educational space of higher education institutions, it is necessary to introduce gamification methods, this can be done by using the following models:

- within the framework of the mixed learning model, the use of an educational gamified system (Lingualeo, Codecademy) as a useful application;
- use of game elements, embedding them in the LMS;
- creation of an educational gamified system by students of higher education (the game "ARTé:Mecenas", developed by employees and students of higher education at Texas A&M University, which makes it possible to follow, for example, the influence of art on the development of the Italian economy in the Renaissance era, acting on behalf of the Medici family) ;
- adding game elements to the educational process of the higher school, leveling out, compared to the gamified system, the negative signs of the traditional educational system.

The choice of game technologies is an additional useful component that should be used in education and is not an alternative to the academic style of presentation of educational material.

It is important, and necessary to simplify educational processes with game elements according to the principle formulated by A. Einstein: "Everything should be simplified as long as possible, but no more" (Kravets, 2017).

8. Experimental verification of the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education.

We believe that the creation of an educational gamified system in institutions of higher education will ensure the formation of professional competence in future specialists, the components of which are motivational, meaningful, active, and reflective components (Zhernovnykova et al., 2020).

The motivational component of the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education stimulates the creative expression of personality in professional activity and is characterized by the purpose, motives, and needs in the professional educational process using gamification, assumes the presence of interest in professional activity, directs the need of future specialists to our acquisition of professional knowledge (Magadán-Díaz et al., 2022).

The content component of the formation of professional competence in future specialists through the provision of an educational gamified system is determined by the depth, completeness, and systematicity of the knowledge of the future specialist and in his future professional activity ensures the free introduction of gamification tools that affect the formation of professional competence, etc.

The activity component in the educational process of a higher education institution contributes to the introduction of gamification tools aimed at forming the development and knowledge of professional competence, creativity, and self-improvement (Abad Escalante et al., 2022).

The reflexive component of the formation of professional competence in future specialists through the provision of an educational gamified system is determined by the attitude of higher education students to their practical activities, to the world, and to themselves. Its components are self-esteem, self-awareness, understanding of one's own importance in the team and self-control, responsibility for the results of one's activities, understanding of the results of one's activities, self-realization, and self-knowledge in professional activity using gamification.
Properties interconnect each component and act as a part of a holistic system of formation of professional competence of future specialists (Plakhotnik et al., 2023).

The study determined the criteria and indicators of the formation of professional competence in future specialists by providing an educational gamified system:

- motivational (ensures the presence of motivation for gamification in education, interest in using gamification tools, and awareness of the purpose of professional activity);
- personal-reflective (reflective analysis, use of knowledge in non-standard situations, correction of professional activity);
- cognitive and informational (a set of knowledge about the legal framework and means of obtaining information, about methods and methods of working with information; knowledge of mechanisms for the development of gamification tools);
- activity (skills and ability to use gamification tools).

It should be noted that the survey of higher education applicants and their questionnaire testified mainly to the average and low level of formation of professional competence in future specialists by providing an educational gamified system at the ascertainment stage of the experiment.

Taking into account the content of the components of the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education and the entire logic of the process of professional training of students of higher education, the technology of its implementation was substantiated.

The experimental stage of the technology for the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education provided students with the formation of a professional focus on the use of gamification tools in future professional activities. The educational gamified system in institutions of higher education consists of a complex of value attitudes, formed motives, associated with the desire to improve one's training, with an active positive interest in gamification tools, enthusiasm for this type of activity, which involves the use of incentives for the successful implementation of the planned.

According to the developed criteria, with the help of a set of measurement procedures, at the control stage during the experiment, the level of formation of professional competence among future specialists was monitored by providing an educational gamified system in higher education institutions. The motivational stage of the developed technology for the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education was evaluated according to the motivational criterion.

The motivational criterion of the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education was checked using a questionnaire. Those seeking higher education were asked to determine the expediency of working with gamification tools in their future professional activities and to evaluate the importance of the proposed motives on a 3-point scale: to improve knowledge; gain professional authority from teachers and colleagues; to motivate one's educational activities during practice; be able to transfer your knowledge to other colleagues; get pleasure from creating didactic video games; successfully pass tests, exams; to gain experience during life for further professional activity; use the Class Dojo mobile application in professional activities; be able to create a professional electronic magazine; self-improvement.

The results of the ascertainment and control stages of the experimental verification of the motivational criterion of the formation of professional competence in future specialists by

providing an educational gamified system in institutions of higher education provide grounds for asserting that higher education applicants of the experimental group (EG) compared to the respondents of the control group (CG) had a significantly higher level of indicator "Motivation for gamification in education".

The increase in EG is +68.0, and in CG the increase is only 7.3.

As a positive, we note the low level of the indicator "Understanding the possibilities of using gamification tools in the educational process." It decreased to 33.2% from 81.1% among EG respondents, and to 52.4% from 82.9% among CG respondents.

We believe that the creation of an educational gamified system in institutions of higher education will ensure the formation of professional competence in future specialists. Therefore, we conducted an experimental study to check the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education, which ensures interest in professional activity, stimulates the creative expression of a specialist in professional activity, and directs his need to acquire competitive knowledge.

In the course of the research, a set of methods was used to ensure the achievement of the goal, namely: theoretical, empirical, and statistical.

Optimal research methods were chosen based on such factors as the field of science, the availability of raw data for analysis, and the amount of material.

The experimental study was conducted during 2022-2023. A total of 86 higher education students participated in the experiment (45 in the control group and 41 in the experimental group). To compare the results in the control and experimental groups, control sections were conducted simultaneously, the goal was for the experimental group – to check the influence of the system of formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education, and in the control group – to check the formation of professional competence of future specialists in the process of training according to the traditional system.

We performed the most important function – control of variables – as part of the validation of the experiment. Special attention was paid to the conceptual area, which refers to the issue of validity control as the basic activity of the experimenter. Validity was defined as the degree of correspondence of the measured variable to the studied property of a real object using an experiment. As the optimal way to increase the validity of the experiment, we chose the preliminary planning of the system of formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education. The design of the experimental procedure will ensure the success of the application of the experimental method in our research.

Validity was assessed using the following criteria:

– physiological – skills, knowledge, comfort, complexity, atmosphere;
– subjective – personal attitude of respondents to specific conditions, and tasks of the experiment;
– performance criteria – acquired skills, volume of performed tasks, time spent;
– accident criteria caused by circumstances in the course of experimental scientific activity and unforeseen factors.

There was a phenomenon of mutual interference in validity because it was the validity that arose as a result of the simultaneous impact on the same object being studied (testing the influence of the system of formation of professional competence in future specialists by providing an educational gamified system in higher education institutions), several groups of methods were involved. Therefore, it is not just the number of methods that are important for the research process, but their competent selection and their quality.

The reliability and effectiveness of empirical research results depend on the optimally developed organizational system for the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education.

After re-diagnosing the level of formation of professional competence among future specialists by providing an educational gamified system in institutions of higher education, we have the following results, which are presented in Figure 1.

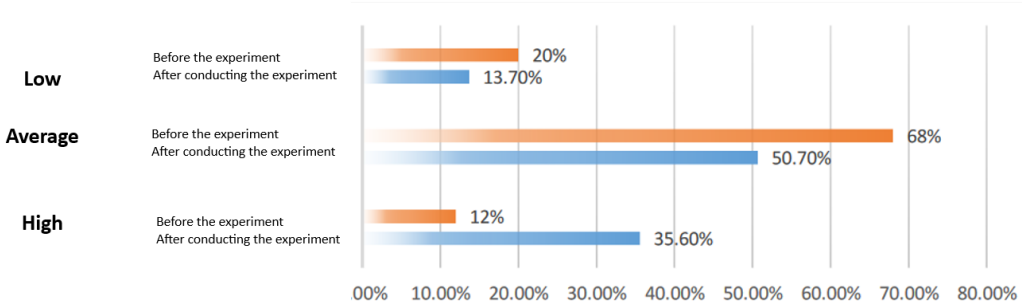

Fig. 1. The results of the comparative analysis of the conducted experiment.

Thus, comparing the results of the data with the initial level of the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education, we can say that in the experimental group, the indicator increased after the application of the work system for the formation of professional competence in future specialists by providing an educational gamified system in institutions of higher education. In the control group, the number of respondents with a high level of formation of end-to-end skills of professional competence in future specialists by providing an educational gamified system in higher education institutions increased by 23.6%, with an average level, the number of respondents decreased by 17.3%, and the number of respondents decreased with a low level by 6.3%.

The data obtained during the control stage testify to the plausibility of the proposed hypothesis and the effectiveness of the developed work system, which contributes to the formation of professional competence in future specialists by providing an educational gamified system in higher education institutions. Therefore, the system of work, which involves the formation of professional competence through the introduction of gamification tools, its key elements, can be used in higher education institutions, as it contributes to the deepening of knowledge in the field of modern education. It can be claimed that we have developed a system for working with gamification in institutions of higher education and it is effective because, in the experimental group, the results of its implementation among the respondents of the experimental group showed positive dynamics.

Conclusions

The content of the terminological apparatus of gamification is theoretically revealed; the main directions of influence and structural elements of gamification are shown; the main areas of influence of gamification on the educational environment are clarified; six steps of game mechanisms for introducing gamification into the educational space are described; the importance of implementation, negative manifestations of gamification for the educational process are shown, and the main aspects of gamification are revealed.

The most effective features of gamification for students of higher education are listed and examples of Internet projects using gamification in the educational space are given.

Such games are described, which differ from other popular media and are the basis of gamification, are interactive (ClassCraft System, Game Based Learning (GBL), and used in education based on the game Minecraft: Education Edition).

The introduction of gamification methods through the use of models is substantiated.

An experimental study was conducted to check the formation of professional competence in future specialists by providing an educational gamified system in higher education institutions, which ensures interest in professional activity, stimulates the creative expression of a specialist in professional activity, and directs his need to acquire competitive knowledge.

Consideration of Internet projects with the use of gamification in the educational space requires further research.

Bibliographic references

Abad Escalante, K. M., Rodriguez Baca, L. S., Godoy Cedeño, C. E., & Alarcón Díaz, M. A. (2022). Gamification as a methodological strategy in university students. *Journal of*

pharmaceutical negative results, 13, 449-453. https://doi.org/10.47750/pnr.2022.13.S02.66

Arufe Giráldez, V., Sanmiguel-Rodríguez, A., Ramos Álvarez, O., & Navarro-Patón, R. (2022). Can Gamification Influence the Academic Performance of Students? *Sustainability*, 14(9), 5115. https://doi.org/10.3390/su14095115

Bondarenko, L. V. (2017). Gamification in the educational process. *In Science of Ukraine – the view of young scientists through the prism of modernity: theses of reports of the First All-Ukrainian scientific and practical conference*. (pp. 84-87). FOP Nechitaylo O.F. https://lib.iitta.gov.ua/706847/1/Zbirnik_tez.pdf

Durmaz, T. B., Fuertes, J. L., & Imbert, R. (2023). Toward usability testing of motivational affordances through gamification. *International Journal of human-computer interaction*, 1-15 https://doi.org/10.1080/10447318.2022.2162277

Frasca, G. (2015). *Play, Videogames and Education Reform*. Massachusetts Institute of Technology. https://acortar.link/m5qLmt

Horban, O. (2019). Educational potential of video games: worldview and methodological basis. *Educational Discourse*, 3-4(26-27), 19-34. https://doi.org/10.28925/2312-5829.2019.3-4.1934

Imeridze, M., Bykov, I., & Velychko, D. (2020). Use of gamification in the educational environment of higher education institutions. *Youth and the market*, 2(181), 81-86. https://doi.org/10.24919/2308-4634.2020.211897

Karabin, O. Y. (2019). Gamification in the educational process as a means of development of younger students. *Pedagogy of the formation of creative personality in higher and secondary schools*, 67(1), 44-47. https://doi.org/10.32840/1992-5786.2019.67-1.9

Kravets, N. S. (2017). Stages of creating a gamified system for use in the educational process of universities. Bulletin of the *Kharkiv State Academy of Culture*, 50, 198-206. http://nbuv.gov.ua/UJRN/haksk_2017_50_19

Liashenko, A. (2017). *Six steps to gamification of learning (with examples).* Ain. https://acortar.link/54nX8L

López de Parra, L., Rojas Bahamón, M., Correa Cruz, L., & Arbeláez Campillo, D. (2017). "Normatividad y estrategias de formación de profesores en tecnologías de la información y la comunicación". Revista Academia y Virtualidad, 10(1), 79-94

López Marí, M., Peirats Chacón, J., & San Martín Alonso, Á. (2022). Factores transformadores de la educación inclusiva mediante la gamificación. Ensayos. *Revista De La Facultad De Educación De Albacete*, 37(1), 34-50. https://revista.uclm.es/index.php/ensayos/article/view/2894

Magadán-Díaz, M., & Rivas-García, J. I. (2022). Graduate students' perceptions of classroom gamification with Quizizz. *Texto Livre*, 15, 36941. https://doi.org/10.35699/1983-3652.2022.36941

Malvasi, V., & Recio-Moreno, D. (2022). Perception of gamification strategies in Italian secondary school. *Alteridad*, 17(1), 50-63. https://doi.org/10.17163/alt.v17n1.2022.04

Pasichnyk, O. O. (2018). Gamification of the foreign language learning process of university students. *Pedagogical education: theory and practice*, 24(2) 344-349. https://acortar.link/CWrz0y

Plakhotnik, O., Zlatnikov, V., Strazhnikova, I., Bidyuk, N., Shkodyn, A., & Kuchai, O. (2023). Use of information technologies for quality training of future specialists. *Amazonia Investiga*, 12(65), 49-58. https://doi.org/10.34069/AI/2023.65.05.5

Sergeieva, L. (2014). Gamification: game mechanics in personnel motivation. *Theory and methods of educational management*, 2(14). https://acortar.link/MmC0YP

Trishchuk, O., Fihol, N., & Volyk, N. (2019). Gamification in the Educational Process. *Technology and Technique of Typography*, 3(65), 72-79. https://doi.org/10.20535/2077-7264.3(65).2019.202000

Vergara, D., Gómez-Vallecillo, A. I., Fernández-Arias, P., & Antón-Sancho, Á. (2023). Gamification and Player Profiles in Higher Education Professors. *International Journal of Game-Based Learning*, 13(1), 1-16. http://doi.org/10.4018/IJGBL.323449

Werbach, K., & Hunter, D. (2015). *The gamification toolkit: dynamics, mechanics, and components for the win*. University of Pennsylvania Press.

Zhernovnykova, O., Peretiaha L., Kovtun, A., Korduban, M., Nalyvaiko, O., & Nalyvaiko, N. (2020). The technology of prospective teachers' digital competence formation using gamification. *Information Technologies and Learning Tools*, 75(1), 170-185. https://doi.org/10.33407/itlt.v75i1.3036