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4.2. Computer business games in higher schools: a proposal and gamified learning framework

The widespread introduction of the latest technologies and the development of an informational way of life causes the convergence of such seemingly incompatible industries as education and computer entertainment, business and video games. This is realized in the development of gamification (gamification) processes – the application of game mechanics, methods, principles and techniques to non-game activities. Therefore, taking into account the rapid development of the game industry, the development of educational computer games is one of the trending areas of information activity today.

The reform of higher education aims at using all resources to increase the effectiveness of the educational process.

The problem of finding new, effective forms, methods, techniques and technologies of teaching and education has always existed, but despite the "age", this problem remains relevant even today. Traditional pedagogy does not always promote the development of students' productive thinking, but prefers reproductive thinking. Modern didactic theory sees its most important task in attracting students to the generalized and systematized experience of humanity, i.e., the acquisition of theoretical knowledge in the content of education, in the orientation to mastering the basics of science, acquires a priority role.

As a rule, traditional pedagogy is mainly guided by the principle of individualization in education, that is, according to N. Sofii, it performs the function of preparing students for future individual activities within a certain discipline or specialty. Therefore, in the process of traditional education, the student will not be able to acquire the necessary abilities and skills in order to make collective decisions, to coordinate his interests with the interests of the team in achieving common goals [1].

In the last decade, the search for new or the reconstruction of old, well-known teaching methods, which would ensure students' activity in the educational process to the greatest extent, has become of great importance. In particular, a business game (didactic, situational role-playing, problem-role-playing, debating, creative, educational), the method of immersion, anticipatory learning, microdiscoveries, synectics (based on the use of analogies and associations), brainstorming, situational, interactive, etc.

Modern educational models emphasize the need to prepare students for their future professional careers, as well as encourage the development of improving their competencies and skills, finding a balance between technical ("hard") skills and social ("soft") skills.

The need to introduce active learning methods (ALM), in particular game methods, into the educational process is highlighted in the scientific and methodological literature and publications of many scientists of the second half of the 20th and the beginning of the 21st centuries. Development of game forms and methods of teaching a foreign language was carried out by: A. A. Derkach, S. D. Shcherbak, T. I. Oliynyk, G. O. Kitayhorodska, H. M. Ter-Saakyants, N. P. Krasovska, O. I Vyshnevskyi.

In the conditions of the rapid development of the information society, reassessment of the essence of knowledge, there is a global rethinking of the content of education and the purpose of education as such. The latter is transformed in accordance with the requirements of informatization (global computerization, mediatization and intellectualization), the growing dynamics of socio-cultural and economic changes, the new labor market and the emergence of new sought-after competencies of future specialists, innovative platforms for the realization of human values in real and virtual life, the latest management paradigms and management ideologies (Fig. 4.2).

In these conditions, knowledge as an object of learning is perceived as a "perishable product" (E. Toffler), and education as "stamping people suitable for survival in a system that will die before they themselves" [2]. All this leads to the need to find new anchors in the sea of unstable knowledge that quickly changes, updates, rethinks, expands, turns over (Flipped Learning), often breaks classical logic and gets rid of the requirements of objectivity.

As an answer, the know-how of management (Knowledge Management) is considered to be the active use of implicit knowledge to solve business problems. I. Nonaka and G. Takeuchi in their book "Company – creator of

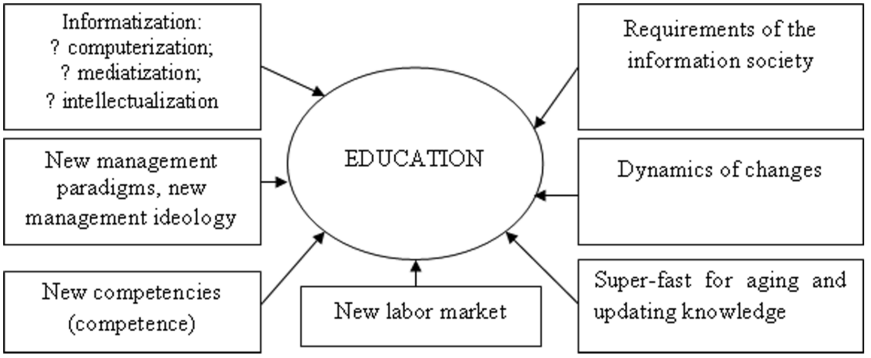

Fig. 4.2. Factors of transformation of the main paradigms of modern education

knowledge" write: "The creation of new knowledge is not limited to the mechanical processing of objective information. Rather, it depends on the hidden views, feelings and vague guesses of each employee" [3].

Also, at the request of training future professionals for business, one of the founders of Sony, Masaru Ibuka, wrote the book "After three, it's too late", in which the main emphasis is placed on game forms of providing a child with a new experience of receiving information [4]. Therefore, in the semantic field of "knowledge", "experience" and "creativity" come to the fore, which are central to the ideology of gamification [5].

The well-known theorist of gamification of learning, James Paul Guy, writes: "Everything that we considered important for brain functions, first of all, following the rules of logic, calculation – is not important now. There has been a revolution in the theory of cognition and the new theory suggests that people learn through experience. Our brain can store the memory of everything we have experienced, and this has a great impact on the learning process. If you follow this logic, he says, the best way to learn is to create conditions for good experience" [6].

All this activates the search for the most effective methods of providing educational material. Gamification belongs to such interdisciplinary methods. Gamification is a complex of motivational management techniques and game methods used in non-game situations [7].

Kevin Werbach, a professor at the Wharton School at the University of Pennsylvania, believes that gamification allows you to combine knowledge

in business, and the toolkit of game developers can be used to solve problems in the business sphere.

Gamification comes in three forms:

1) competition as the main component of game motivation, where such elements as tournament tables, clear goals and rules are used;

2) "win-win" type mechanism, a game without a winner, so it is pleasant in its process;

3) aesthetics, the purpose of which is to visualize, make clear and pleasant the goals, tasks, vector of development, to increase the visibility of the results of the employees' work.

Gamification can also be applied as a tool or method for [8]:

– visualization of the organization's business processes, their situational and prognostic analysis by immersion in a situation simulated by an electronic game;

– involvement of employees in work and staff motivation (for the work performed, the employee receives points, which are fixed on a special online service, and then transformed into financial or non-financial rewards);

– staff training at workplaces (use of online simulators, simulation games);

– team building and development of corporate culture;

– recruiting and adaptation (use of special game tests for compatibility with company values, organization of creative contests during hiring);

– increasing the efficiency of the innovation process in the organization (for example, creating an online platform where employees post their ideas and can vote and discuss the ideas of their colleagues);

– visualization of successes and achievements (with the help of virtual boards of honor, likes and comments, employees confirm the benefit of their actions not only from the side of management, but also from colleagues).

The gamification method is used in various spheres of life: health; crowdsourcing; learning programming; edutainment – entertainment that makes up media content: video games, television, Internet. It is a combination of media and entertainment; education (learning and education) – game education in which the principles of computer games are implemented. Video games have come a long way from the status of children's entertainment, through panic over the negative effects of addiction and game elements of violence, to the status of a social norm. Therefore, the interest in the game is

usually higher than in any traditional type of learning. Nowadays, video games are entertainment, fitness, eSports, business and learning [9]. Games create ideal conditions for a person (student) to enter the most pleasant and creative state. So game learning was recognized as an important alternative or supplement to traditional learning in the classroom [10].

The main principles of learning implemented in computer games are:

1. The principle of active and critical thinking, where all aspects of the learning environment are designed to encourage active and critical learning.

2. Design principle – this design is considered as an important aspect of learning: any, even the simplest, game is better than a well-designed text.

3. The principle of semiotics is students' understanding of complex environments and relationships.

4. The principle of goal thinking is when students learn to see the relationships between different worlds and events.

5. The principle of "psychosocial moratorium", when students take risks, learn from mistakes, due to which they learn much faster than with traditional methods of learning.

6. The principle of responsible learning, when students become more responsible because they are part of a group of like-minded people in which they all have a common identity.

7. Principle of identity – virtual identity is as important as real one. This improves the self-esteem and self-awareness of those who study.

8. The principle of practicality, when achieving success is possible only through constant practice and application of acquired knowledge, skills and abilities.

9. The principle of gradually increasing the complexity of tasks, when the plot of the game and "gameplay" gradually unfolds from simple tasks and scenarios to complex ones.

10. The principle of transfer, when learned skills are applied to solve practical problems.

11. The "model of cultures" principle, when students have to think about possible cultural conflicts in the game.

12. The principle of his person (insider) – a student is more than a student, he is a teacher and creator of consciousness, etc.

The effectiveness of training largely depends on the interest of students, the motivation that stimulates their active activity. Will is important for

achieving the set goal. Any game requires following certain rules and using them creatively. In the process of playing computer business games, optimal conditions are created for the development of creative thinking. According to the learning pyramid developed by American scientists in the 1980s, 75% of information is learned through didactic games.

So, a computer business game is a group form of learning, in the process of which the role structure of conducting a lesson is used, that is, a set of roles that regulate the activity and behavior of students. Role play plays an important role in activating the educational process. This is achieved by activating the cognitive-evaluative and practical activities of the participants of the class, by a certain organization of their interaction and communication.

In modern psychological and pedagogical science, there are various classifications of computer business games. One of the possibilities is classification by the type of tasks and roles used. According to it, educational role-playing games and business games are distinguished. The main purpose of an educational role-playing game is to provide a comprehensive and in-depth analysis of a particular problem using so-called educational roles. The business game is aimed at imitating real business (professional, domestic, etc.) situations, performing "real" and not "educational" roles, so that students acquire the skills and abilities necessary to perform various types of practical activities.

P. M. Shcherban proposes a classification of educational and pedagogical games in the form of a pyramid, at the base of which are role-playing games, brainstorming and game design, which are narrowed down to simulation and situational games, at the top of the pyramid are organizational and business games. The game is the main form of manifestation of the child's activity, a means of learning about the surrounding world.

The organizational unit of the role-playing game is the situation that is "played out". It unfolds during the lesson as a separate plot. Such a plot can be based on an educational or real-life problem, a necessary and sufficient set of roles (participants in the situation) is established, which are distributed among the participants. Each student participating in the game must fulfill a certain role, following the role prescriptions from the teacher-leader of the lesson throughout the game.

Role-playing games, according to Y. Yemelyanova, similar to the methods of analyzing problem situations according to their psychological

parameters (motivation, participation of intellectual resources, emotional coloring). In contrast to the spontaneous discussion adopted in discussion methods, which is accompanied by the teacher's subjective assessment, operational games have a scenario in which the algorithm of "correctness" and "incorrectness" of the decision is embedded.

V. Chuprasova, based on the definition of active learning methods as methods that contribute to the organization of cognitive activity of students, offers the following classification of active learning methods:

a) communicative methods (group discussions, lectures, problem situations);

b) game methods (didactic games, role-playing games, business games);

c) constructive (problem-based learning, programmed learning);

d) corrective methods (self-training, game psychotherapy, psychodramatic correction) [11].

In our opinion, the most successful is the classification of active learning methods, for which the starting point is the simulative nature of its construction (from the English simulation "imitation"). All methods of active learning, in our opinion, can be divided into two groups – non-simulative and simulative. Let us briefly describe these groups.

All non-simulation methods can have a non-game and game character. The group of non-simulation methods of a non-game nature includes a problem lecture, heuristic conversation, educational discussion, exploratory laboratory work, research method, independent work with the curriculum. Non-simulation methods of teaching allow to activate the educational process within the framework of traditional forms of education, the basis of which, in our opinion, are lectures, seminars, practical, laboratory classes.

Computer and video games differ from other popular media in that they are interactive and involve personal participation. They allow players to act in different roles (scientist, traveler, inventor, political leader), set tasks, make choices and evaluate their consequences. Games provide an opportunity to act at your own level and not be afraid to make mistakes. But the most important thing is that they give players (gamers) freedom of choice, that is, the ability to influence the situation both in the virtual and in the real environment. Active video games develop visual attention, visual-motor coordination and even improve eyesight. It was found [12] that surgeons who had spent at least three hours a day playing video games in the past performed laparoscopic surgeries faster and more accurately than their

colleagues who did not play games. Specially designed computer games [13] to influence the improvement of memory and attention in the elderly [14].

Computer games have had such an impact on society that a steady trend towards gamification for non-game application software has been noted in information technology [15].

Computer-based business games simulate competitive market situations of the same level and complexity as what students would find in a real-world situation that is difficult to recreate in the classroom, such as being a company owner or being able to make high-level decisions. They provide a comprehensive view as a proxy for real-world learning. Students are able to develop relevant transversal competences such as teamwork, communication or previous business experience by testing real-world business scenarios. In addition, they can include crowdsourcing networks that encourage the generation and identification of leadership skills. In addition, simulation tools allow students to apply their theoretical knowledge and develop their communication skills inside and outside the classroom. They allow universities to make better use of their resources and reduce costs while ensuring access to quality education.

The expansion or globalization of higher education is one of the most significant achievements of the welfare society, but the current socio-economic context requires a review of the capacity of the traditional model of the university, not only in terms of its economic viability, but also in terms of social aspects

Thus, while restrictive budget policies in the countries of the European Union (EU) led to a reduction in public funding to Spanish public universities, the training of in-demand professionals and access to universities for other groups increased. This is part of a major global challenge reflected in the 2030 Agenda.

The COVID-19 pandemic has highlighted the difficulties faced by universities as social organizations to be sustainable while adapting to the demands of society. Universities have had to adapt their teaching to this "sudden" demand by combining face-to-face, blended and virtual learning, even in the same subject, to be sustainable. It should be noted that, in general, domestic scientists and practicing educators expressed different points of view regarding the implementation of distance and mixed learning in institutions of higher education, and highlighted their positive and negative aspects.

As a result, both supporters and critics of the mentioned learning models appeared. However, the emergence of harsh quarantine restrictions caused by the COVID-19 pandemic has put higher education institutions in front of the fact that in modern conditions, it is blended learning that is the most universal learning system, which is not only capable of flexibly implementing any changes in the surrounding environment, but also optimal in a way to combine the advantages of traditional and distance learning.

In particular, from 2020, domestic educational institutions, like institutions in other countries, were forced to switch to distance learning, and later to a mixed form of education. If previously the development of these types of education in higher education was more or less chaotic, the corona crisis necessitated the implementation of organized management of education in the mentioned formats both at the state level and at the level of individual institutions of higher education. Considering that there has been a war in our country since February 2022, educational institutions are forced to work remotely or in a mixed format.

Computer business games are special cases of gamification, that is, a growing trend from the point of view of game-based learning. Research on gamification is relatively new, and studies widely emphasize the benefits of using gamification in teaching. For example, its use increases the effectiveness of the learning process, contributing not only to the practical application of interdisciplinary knowledge gained in the classroom, but also through the development of important communication skills for work in the enterprise, for example, teamwork, critical thinking or problem solving.

However, despite these benefits of general learning, empirical evidence and the impact of computer games on higher education are currently limited. Although the amount of research is increasing, since the educational features of computer games are not sufficiently studied. In general, research has been limited in scope in one way or another, focusing mainly on motivation (or in the field of computing, and only a few studies can be found on their integration into formal education.

First of all, educators focus on defining the context and conditions that support the integration of business simulations into formal learning environments, trying to answer the questions of when, with whom, and under what conditions a business game should be integrated into the learning process to maximize its learning potential. The researchers will then assess

whether its use is useful and meets the needs, requirements and goals of all agents of the educational ecosystem: namely, companies seeking to attract and hire talented students as future workers, and the university focusing on student training.

The selected simulators are the Global Management Challenge (GMC), the largest strategy and management competition in the world, and Gestionet, developed by a company that offers digital solutions based on gamification and simulation. In addition, as part of the research, teachers and researchers are developing the following in their dual role: a gamified learning system with the integration of the use of simulators within the curriculum and elements for evaluating student performance. This study included triangulation as well. Researchers collected data that represent multiple perspectives on the same situation through surveys of students and firms (quantitative research).

GMC and Gestionet proved to be excellent tools for the opportunity to gain new experiences for students studying financial subjects to strengthen students' competencies, internal technical and external transversal competencies. The data shows how simulations help all actors achieve their goals. The simulator helps students develop the various transversal skills required by the company, as some, if not all, hard and soft skills are included in the business game. While the university emphasizes that student participation has contributed to its use in the learning process, firms emphasize that this type of activity allows them to observe how students adapt to possible changes in the environment, react to different situations or work in a team.

Although computer-based business games, as a learning support tool, require professors to adjust the mechanics, dynamics, and emotions for the game to achieve its goal, the findings encourage the development of the use of similar experiences in other fields of knowledge. High-powered learning technologies, such as simulators, allow you to get high knowledge of achievements and the acquisition of new competencies with the help of more dedication, participation, satisfaction and global satisfaction of students.

Simulations and games have become increasingly important in teaching and learning methods in higher education in recent years. A typology of simulations and games has been developed, which distinguishes between computer and non-computer simulations and games.

This, in turn, is focused on the growth of the use of serious computer games, mainly due to its ability to increase the motivation and involvement of students in the learning process, which can be attributed, among others, to the use of social networks and digital resources.

This is supported by the fact that the current generation of university students includes both the millennial generation (mostly undergraduate students) and generation Z (new university entrants), who often use the Internet and social networks because they have been part of their lives and socialization with the very beginning In contrast, a structure that combines punishment and rewards appears to increase student attendance, performance, and grades. These potential implications of simulation and gaming make it a suitable approach to higher education.

Simulations or games used by educators attempt to simulate or represent aspects of the real world to facilitate learning and can act as a bridge between traditional classroom learning and real-world learning.

For example, students can make decisions about aspects of marketing, finance, production or human resources in a computer simulation game business and see the results of these decisions in the market without any interaction with real firms and overcoming problems of risk, cost and time frame. In addition, from an educational perspective, students can learn through the process of mistakes, as people tend to explore the reasons for their failures more than for success and to repeat learning experiences from extended experiences, because these learning experiences create and change their knowledge by adapting and continuing to transform these experiences.

The right combination of game learning and tasks, according to their abilities, can lead students to the so-called "flow" state. It is a state of complete concentration and involvement in the task at hand, losing track of time and interest for stimuli unrelated to the task at hand, and this entails obtaining greater productivity during the time spent, which can mean more knowledge gained as a result both concentration and motivation. The state of concentration is determined by the four elements that comprise common games: goals, rules, feedback, and voluntary participation. Overall, research shows that learning in this state will be an effective and efficient way for participants to learn and acquire skills.

The introduction of business games in the educational process solves the following tasks: develops students' practical thinking, the ability to

analyze the situation, make constructive decisions; the content of business games is the imitation of the conditions of certain situations, its dynamics, as well as the activities and relationships of the individuals involved in it; fulfilling the requirements of the game, its participants adopt professional norms of communication.

A business game today is an imitation of professional activity. The characteristic features of business games are as follows: the presence of a problem, goal, tasks; reduction of the time scale; distribution and playing of roles; the presence of situations that are resolved sequentially, several situations; several stages of the game; formation of students' independent decisions; the presence of an incentive system; consideration of possible obstacles; objectivity of assessment of game results; summing up.

The game is a unique mechanism of accumulation and transfer of acquired experience. In the game, the active position of its participants is actualized and finds its behavioral manifestation. The game as a method of building the educational process with the aim of mastering social reality contains the following components: game roles and their acceptance, construction according to the defined rules of the game action, modeling of the game process and emotional tension (game technology). The main component of the game is the role and its perception. Acceptance of the role is carried out at the cognitive, emotional and behavioral levels. They are implemented through the assignment of external features and norms of behavior, as well as tasks inherent in the role, its performance [16].

The business game combines two different principles of learning: the principle of modeling future professional activity and the principle of problem solving. In the business game, the process of solving the problem is exploratory and research. The requirements for educational game tasks are reduced to the following:

– the task must be relevant, its solution requires basic knowledge, imagination and creative abilities of students;

– the task must be sufficiently complex, but accessible for solution, it must encourage the use of existing knowledge and the search for new principles, facts, and methods of solution.

Repeated playing of the same type of games develops the necessary skills in the student. Currently, educational business games on problem situations are being developed. The most favorable conditions for using

educational games are the final stage of academic studies, because senior students already have a certain level of knowledge and are able to work independently. Specialization of education opens up new opportunities in planning and organizing problem situations when solving educational problems. You can build educational games simulating the search for solutions to complex problems by students of various specialties. The use of business games when learning a foreign language, in particular, contributes to the development of communicative competence and the personality of the future specialist.

In the center of the game simulation of the future professional activity, the construction of a simulation model is provided, which simultaneously embodies the most characteristic features and properties of a real object and most fully reflects the essential aspects of the studied disciplines. The activity of the teacher in the educational game is reduced to its coordination, organization and management. The goal of the students' gaming activity is three-fold: acquiring knowledge and skills for future professional work; evaluation of oneself in the role performed; victory in the competition.

According to the classifications existing today, the didactic game belongs to the type of artificial games, belongs to the class of effective games and is a type of simulation games. Simulation games are simulations of real models (game object) and real activity (game object) in active systems. A didactic simulation game is an imitation of a real system of the educational process (or its separate cycles) taking into account the peculiarities of the educational processes. A didactic game implies a clear pedagogical focus of game activity on achieving the goal of education and upbringing. The game has its own goal, means of achieving it, its own process of passing. The goals of any game are determined by its dual nature: on the one hand, game participants are faced with the need to act in accordance with the requirements of a real situation, on the other hand, they must implement game functions. The art of the student consists in the ability to master the skills of two-dimensional behavior [17].

Game actions are determined by the target aspect of the game. They can be set in different ways: by the script, the game leader, regulatory documents, or they are formed by the players themselves in accordance with their own vision of the situation and the goals set for them. Organizing and conducting a business game is a very long and time-consuming process.

It consists in creating a game simulation model, determining the goal, the subject of the game and the stages of its implementation, creating a scenario, a graphic model of the interaction of the participants, determining the rules of the game and the evaluation system of the participants. The organizers of the game can spend a lot of time implementing it into the educational process, but it is worth being indifferent to its main performers, not taking into account their individual characteristics, views on their future professional activities, the relationships of students in the group, and the game ceases to be a game.

The success of game classes depends on the correct choice of the right form of the game from the relevant topic being studied, the correct selection of tasks, the clear selection of tasks, the distribution of responsibilities among students taking into account their individual characteristics.

There are three categories of game elements used in gamification: dynamics, mechanics, and components.

This structure of the gamified system is used to solve business problems and is used in education. The main goal of game design is to combine all these elements.

Dynamics is a higher level of abstraction. The most important game dynamics:

– restrictions (limits or forced compromises);

– emotions (curiosity, competitive spirit, disappointment, happiness);

– story (sequential, continuous storyline);

– promotion (player growth and development);

– relationships (social interactions form a sense of camaraderie, status and altruism).

Dynamics are general aspects of a gamified system that need to be considered and managed, but cannot be directly implemented into the game. An analogue from the management world can be the improvement of the qualifications of employees.

Mechanics – the main processes that drive actions and form the involvement of the player. Ten important game mechanics can be identified:

– tasks (riddles or any other tasks that require effort to solve);

– chance (elements of chance);

– competition (a group of players or one player wins, and another group or another player loses);

– cooperation (players must work together to achieve a common goal);
– feedback (information about the player's promotion);
– accumulation of resources (obtaining useful or collectible items);
– rewards (rewards for certain actions and achievements);
– agreements (trade transactions between players, directly or through intermediaries);
– moves (alternate participation of players);
– the state of victory (indicators that turn a player or team into a winner; the state of winning and losing are related concepts).

Each *mechanic* is a way of achieving one or more of the described dynamics. A chance event, like an unexpected reward, can stimulate player engagement and curiosity. In the same way, it is possible to attract new participants (adaptation of new players) or retain the interest of experienced players (curve of interest [19]). In addition to the ten listed basic mechanics, other mechanics can be used in the game [20]. The example [21] lists 47 different game mechanics out of 50 that can be mixed to create the foundation for different types of games.

Components are the more concrete form that mechanics and dynamics take. In the book [18], fifteen important game components are named:
– achievements (certain goals);
– avatars (visualization of the character of the player);
– badges (visualization of achievements);
– battles with bosses (especially difficult tests to move to the next level);
– collecting (accumulation of sets of items or badges);
– battles (concrete struggle, usually fast);
– access to content (what is revealed to players when they reach certain indicators);
– gifts (the ability to share resources with others);
– leader ratings (visualization of player development and achievements);
– levels (certain steps in player development);
– points (quantitative reflection of game development);
– quests (specific tasks with their own goals and rewards);
– social profile (visualization of the game in the player's social network);
– teams (certain groups of players who work together for a common goal);
– virtual goods (game assets with a subjective or real monetary value).

In the course of the research, the authors of the book [18] checked more than 100 options for implementing gamification and found that most of the gamified systems are based on PBL (points, badges, levels): points, badges, and ratings.

Points in gamification [18] are effective for keeping score. They can determine the state of victory in the gamified process, create a connection between progress in the game and external rewards, guarantee feedback, can be an external indicator of progress; they provide the necessary information for the game designer. Points earned by the user can be easily tracked or remembered. This allows the designer to analyze important system indicators.

Points are used to give players a sense of their skill and advancement. Each additional point indicates a larger score.

Badges are often used together with glasses. Badges are a visual representation of some achievements within the gamified process. Example: the system displays a new badge if the user exceeds a certain threshold number of points. Badges can become a reason for users to strive forward, which proves their positive motivational effect. They give an idea of what can be achieved in this system, and also create a kind of notation of what needs to be done here. This is a very important characteristic for "adaptation" or attracting new users to the system. Badges are a signal of what worries the user and what he does. They are like a kind of visual markers of his reputation, and therefore members often receive badges in order to show others what they are capable of. Badges play the role of virtual status symbols and confirmation of the user's personal experience in the gamification system. Badges serve as family markers. A user who has some badges matching the badges of other users will feel a sense of belonging to this group of people, and a thoughtful gamification design can combine badges with a group identification system. One of the most important characteristics of badges is their flexibility. Different types of badges can be awarded for different activities**.**

Ratings. Thanks to the ratings, players can know their position in relation to their competitors. The ranking creates an environment for development that points and badges do not. If there are important indicators for the game, then the rating makes these indicators public – everyone can see them. In the right context, ratings can be powerful motivators.

Understanding that a few points are enough to move up a step or even to the top step of the rating can serve as a strong impetus for users.

Aesthetics. The structure of "mechanics-dynamics-aesthetics" is also adopted in game design. This structure formalizes the consumption of games, dividing them into three components – mechanics, dynamics and aesthetics. Aesthetics are emotional reactions of the player: joy, disappointment, imagination, communication. From the designer's point of view, mechanics generate dynamics, which, in turn, generate aesthetics. This relationship is a difficult task for the game designer, because he can only influence the mechanics and only through them can he design meaningful dynamics and aesthetics for the player. The player has the opposite: he experiences the game through the aesthetics provided by the dynamics of the game, which in turn arose from the mechanics.

K. Werbach and D. Hunter [18] proposed the concept of 6D – six steps to gamification for the development of gamified systems. The concept is called 6D because all the steps in English begin with the letter D. Next, we will consider these steps in the context of the process of designing a gamified system for business.

1. Define business objectives (Define business objectives). The first step is to define business goals. Gamification is not about creating something that people love. Gamification is part of that something. If you create something that people love, then it makes sense to solve the task of creation in such a way that employees become more efficient, that they feel a sense of satisfaction at work, increase productivity based on a certain productivity indicator. Otherwise, the system will not be successful for business. So, the first step is to define very precisely the business objectives.

2. Delineate target behaviors of participants. This leads to a number of questions. What should participants do? How can this activity be measured? Does it contribute directly or indirectly to the achievement of the indicated business objectives? What are the specific specific steps that people will take? The next step is to ask what kind of group of people this is.

3. Describe the players (Describeyourplayers). How can you characterize people who will participate in gamified activity? It's important to think of them as players. They are not just users, they are people who voluntarily play the game, who should feel satisfied and interact with each other and also want to continue playing. In the description of players, it makes sense to use

their demographic characteristics (age, gender), psychographic characteristics (life position, values, attitude to innovations), as well as to divide players into types. This is necessary in order to choose optimal game elements and structures. For example, to choose the principle on which the game interaction will be based: is it rivalry or cooperation?

4. Devise your activity loops. There are two types of cycles in games: the engagement cycle and the progression cycle. The first one works like this: Motivation – Action – Feedback and Motivation again. Tasks become more difficult as skill increases. The progression cycle is responsible for advancing the player from the starting point to the final point, with the player completing separate tasks that lead him to the goal. In examples of gamification where there is no clear route for participants, the progress loop can be tied to completing a profile or completing a complex multi-step task. It is also worth considering separately what a beginner should do to become a full-fledged participant in gamification.

5. Do not forget the fun. It's about what makes gamification not just a set of points, but something really meaningful to the participant. This point can be considered as a control question: you have planned something, and then you ask yourself: "Will it be interesting for the players? What will motivate them? Will we be able to get by only with internal motivation or will we need external motivation?"

6. Use the appropriate tools (Deploy the appropriate tools). The tools of games are not limited to points, badges and ratings. There are also avatars, achievements, boss battles, collectibles, battles, new content to discover, quests, virtual goods, social interaction and much more. At the tools stage, you need to define the specific content of gamification and technical requirements.

You should also determine the platforms (Windows, iOS, Android) through which the interaction will take place. When solving the task of gamification of an educational course, you can use the infographic by Mia Mack Meekin [22] "Six steps for adding gamification to an existing educational course".

Step 1: Identify and clarify learning objectives. It is necessary to use verbs (Bloom's taxonomy) for learning purposes and to make sure that they are measurable, that is, they carry meaning.

Step 2: choose an idea. That is, to determine which idea can be the main one.

Step 3: Break the game into frames. The phrase "a picture is worth a thousand words" refers to game design. The storyboarding of the game should be done before the game is accepted and after the development of the idea and the writing of the game script. It is not necessary that the user interface is fully defined, but it is important to note what role the user interface plays in achieving the goal.

Step 4: develop learning activities. Learning activities will take place during the learning period, will contain answers to questions, including what the teacher will do, and what the student will do: What will the students learn? How will students demonstrate their knowledge? What types of activities will students be involved in during their studies? What activities will teachers participate in to support students in their learning?

Step 5: Create teams. Games can be played individually or within groups / teams.

Step 6: Apply the game creation toolkit.

Yu-kai Zhou, who is a pioneer in the field of gamification, presented on the website [23] the Top 10 examples of gamification in education, which, in his opinion, will change our future:

1. Duolingo – language learning during web translation.

2. Ribbon Hero is a game that teaches how to use Microsoft Office.

3. ClassDojo – putting the class into the game with rewards and instant feedback.

4. GoalBook is an online platform that helps teachers, parents and students track progress together.

5. The World Peace Game – a game for modeling politics in the classroom.

6. Coursera is an educational technology and social entrepreneurship company that works with leading universities to help make some of their online courses available for free.

7. Mr Pai's Class – providing digital assistance in the classroom. Teacher A. Pye [55] directed games to teach third graders to teach them reading and mathematics.

8. CourseHero – online teacher-student interaction. Course Hero, an education technology company, provides students with course-specific content, tools and services to help them learn and succeed more effectively.

9. Brainscape – introduces repetition into the game, which builds confidence. Brainscape is a web and mobile software company specializing in educational assistance.

10. Socrative 101 – mobile interaction between teacher and student. Enables teachers to create and assess student learning activities on tablets, laptops, and smartphones.

Through the use of real-time questions, instant aggregation of results and visualization, teachers assess the current level of understanding of the entire class. The considered example of creating a gamified element refers to the social sphere, but it is general enough to be used in some subject area. In general, building a gamified environment requires consideration of many aspects [24]. There are many game artifacts (Fig. 4.3) that can be used to gamify education (some variant of blended learning in a specific subject area. Badges and points are the simplest of artifacts. It is necessary to choose a solution that stimulates the desired behavior while not forgetting about complexity games and use artifacts situationally.

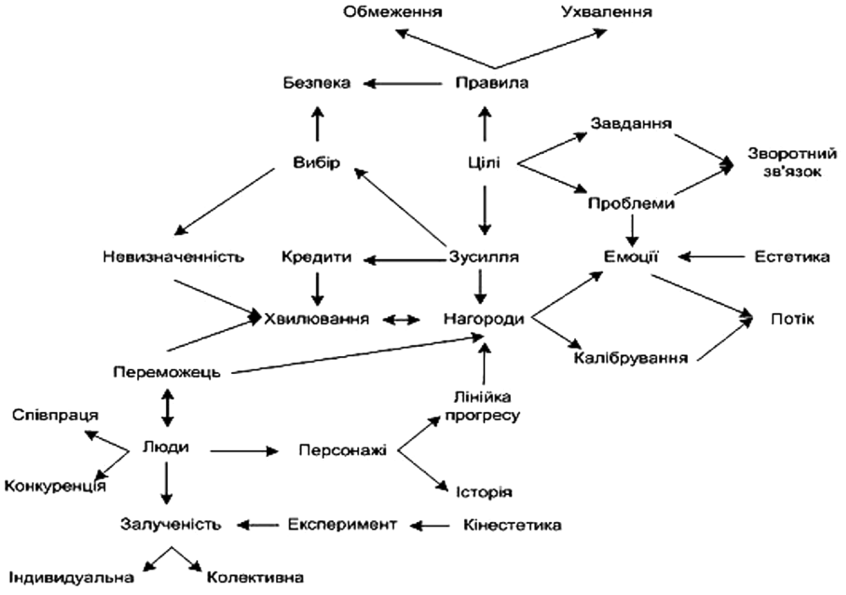

Fig. 4.3. Options for building a gamified environment

So, for example, when gamifying the educational environment, its users (those who study) are involved in interaction. Players need to encourage competition and/or cooperation.

Goals in games are achieved through challenges and/or tasks. They bring emotions that engage and stimulate players. Problems and tasks should be associated with feedback that allows players to understand the problem, solve it, and move to the next level of competence. It is necessary to bring some roles to the learning environment that will help students learn new competencies. Players are usually given rewards at the end of the game. For this, medals, cups and other trophies should be provided. During the game, you can assign points and badges, as well as show the development of the player's avatar or a progress bar, and then announce the winner. Rewards, however, must be associated with effort. And the result of this work (the state of satisfaction in achieving the goal) in itself should become the most significant element of the reward system. And lastly, the power of the reward will be much greater if it initiates the gratitude of the users.

The following features of gamification can help a student (who can become a real gamer) in a gamified educational environment [25]:

• "Extremely necessary" optimism: gamers are characterized by extreme self-motivation. They act immediately and resolutely attack obstacles and always believe that there is a real chance of success.

• Social canvas – through play, people find spiritual kinship with other players, they hope that these people will support collective endeavors and develop a deep understanding of cooperation and its benefits.

• "Happy" performance – playing while working hard makes the gamer happier than it would normally be when resting or sitting idle. During the game, the individual optimizes his performance and enjoys it.

• Epic Meaning – The challenge-oriented nature of the game allows players to feel like they are a part of something bigger than themselves, and people love the feeling of being a part of something big.

This feeling drives and inspires them to keep playing to solve whatever problem they face. Therefore, learning enriched with game technologies: becomes innovative; changes the form of training organization from traditional to more flexible and personalized; increases the interactivity and autonomy of learning; forces every student to think, to be attentive, collected and purposeful, to feel part of something bigger, to immerse himself

deeply in the process, to constantly develop and self-informed and multidimensional assessment of the real achievements of students with the possibility of constantly obtaining and analyzing information about students due to feedback, reflection . The above allows considering gamification as one of the ways of using new technologies in the educational process of higher education.

The *main principle of gamification* is to provide constant, measurable feedback from the user, which provides the possibility of dynamically adjusting his behavior.

The main elements of the game process that can be used for educational purposes include:

– *dynamics* – a visual display of gradual growth (levels of game complexity that expand and open access to content, scenarios that require users' attention and reactions in real time; a reward that determines the significance of the work performed);

– *mechanics* – the use of scenario elements characteristic of gameplay, such as virtual awards, statuses, virtual goods;

– *gradual discovery of information* (bonuses as unexpected rewards; a countdown that stimulates the completion of a task in a limited period of time; researching one's educational environment and discovering new knowledge; preventing the loss of what has already been earned; continuous game to obtain an expert level; synthesis of knowledge during solving tasks requires several skills at once.

– *satisfaction from own contribution to the gam*e (achievement, i.e. public recognition of completion of work; new tasks that can be obtained when logging in; working together to achieve goals; obtaining meaningful results; creating an overall game experience that promotes emotional involvement of the user; virtuality for attraction of new players);

– *social interaction* – a wide range of techniques that provide user interaction characteristic of games.

The following three areas of student behavior in the game, which are affected by gamification, are distinguished:

– *cognitive* (the game has a complex system of rules for players, which are aimed at increasing their skill as the game progresses. The game provides solutions to specific problems adapted to the skill level of the player. Increasing the complexity helps players acquire the appropriate skills. The

content and organization of the game provide for several routes, that ensure success and allow students to choose their own intermediate goals within the overall task);

– *emotional* (participation in the game allows players to feel strong emotions – from joy to disappointment. Achieved successes can cause positive emotions in students, such as optimism and pride. This is due to the fact that in order to acquire new knowledge, the player at some stage of the game has to to fail. During the game, the students' attitude towards mistakes changes (the student has the right to make a mistake, he does not get a bad grade for a wrong answer);

– *social* (the content of the game and its organization allow players to perform new roles and make decisions based on different points of view. Playing alone or in code, explore new personal boundaries, develop readiness for teamwork, dialogic speech, and curiosity).

However, if gamification is understood as a tool to support learning, it is necessary to clarify which educational goals can be promoted and how, since these three interrelated principles can create explicit and tacit contexts and problems. In addition, different elements serve different learning purposes, although both soft and hard skills can be learned in business simulations, an integrative approach combining technology and learning scenarios is necessary.

If we understand computer business games as a tool to support learning, it is necessary to conduct more research on how teachers should adjust the mechanics, dynamics and appropriate emotions to create a game to achieve its purpose.

Therefore, it is very important to investigate the following questions:

1. How to implement a computer business game under the structure of MDE and involving all interested parties (firm, universities, professors and students)?

2. What strategies can be used to maintain gamified engagement activities?

3. How can you increase the interest and experience of students in other increase their participation?

4. What impact does gamified education have on students in the classroom (academic skills) and extracurricular activities (career development)?

The game community created in gamified learning acts as a community of players who mutually motivate each other, provide support and help to each other at the same time. Gamification relies on the creation of a legend, some story with dramatic techniques, accompanying the game application. The inclusion of the player in the game story creates a feeling of active involvement in the game events, gives personal meaningfulness to his actions and deeds, generates a feeling of contribution to the common cause, forms motivation to achieve the goals set in the game, interest in success, stimulates the desire for further development and learning.

Gamification in higher education allows you to create such an informational and educational environment that contributes to the independent, active desire of students to acquire knowledge, professional skills and abilities, such as critical thinking, the ability to make decisions, teamwork, readiness for cooperation; helps reveal creative abilities and motivates self-education. It is an effective tool for improving professional education, as it allows: to improve the assimilation of educational material; involve students in the educational process, making it interesting; to provide systematic, continuous, in-depth study of the academic discipline; to form a personality through the experience of defeats and mistakes, correcting its behavior, forming a system of competencies necessary for future professional activity [26].

In the world, the number of educational projects with elements of gamification is gradually increasing, new educational programs with game methods are being created, game technologies with a multifunctional interface designed for the user are being developed, various platforms are being modified for ideas of gamification of education.

Projects such as World of Warcraft, Minecraft (an online simulator in the open world of which players can create anything they want from blocks and interact with other players) with a multi-functional user interface are successfully implemented in modern higher education.

The latest software and technical support offers teachers many platforms that allow them to implement various ideas of gamification of learning.

An interesting project is the World of Classcraft (WoC), thanks to which learners successfully cope with tasks (for example, correctly answering questions or helping their colleagues), gain experience points and can level up their character, and acquire special abilities. In WoC, monsters are

homework, boss battles are control tests, and the audience is a space to play, which helps to increase students' motivation, desire to learn and become a "high-level warrior" in the team.

The SAP Stream Work platform is characterized by high quality and game functionality, the gamified version of which ensures the implementation of game dynamics in decision-making tools (brainstorming and "quick focus" methods). Game elements such as a leaderboard, achievements, and a progress bar were included in the brainstorming method. The tool "quick focus" was supplemented with game elements "scores", "leadership lists", "achievements".

Consider examples of popular video games that are used for educational purposes:

– Sweatshop "Sweatshop" – research on various issues of the company's activity.

– http: //www.kongregate.com/games/channelfour/ sweatshop

– The Migrant Trail – immigration issues, immigration between Mexico and the United States. – http://theundocumented.com/

– Darfur is Dying – problems of refugees, war, humanitarian crisis. – http://www.darfurisdying.com

– To Build a Better Mousetrap – enterprise and its transformation. – http://www.molleindustria.org/to-build-a-better-mousetrap

– Ayiti The Cost of Life – "Ayiti – the cost of life" – issues related to the low standard of living. – https://ayiti.globalkids.org/game/

– Quandary – strategies for solving conflict situations. – http:// www.quandarygame.org/play?language=es

– Against All Odds – from the lives of refugees. – http:// www.playagainstallodds.ca/

– James Paul Gee on video games, learning and media literacy. – https:/ /www. youtube.com/watch?v=LNfPdaKYOPI

– Chris Thorne "James Paul Guy on the Principles of the Game." – https://youtu.be/ 4aQAgAjTozk

– Jan Bogost on serious games. – https://www.youtube.com/watch? v=uTK2oIJx8Po

– Sasha Barab "Transforming Game". – https://www.youtube.com/ watch?v=UT-B_toTlao

– Sasha Barab "The power of games" – https://www.youtube.com/ watch?v=JGKjhxthRBY

Computer business games simulate the reality of a company's board of directors in complex daily management and offer an experiential impact on understanding business and management issues. Success in this requires both soft and hard mission skills. Soft skills such as team building, communication, interpersonal skills, negotiation and collaboration are important, while hard skills include product knowledge, sales, decision making skills, innovation, and others related to business management.

Students, united in teams of 3–5 people each, create a competitive market company (7–8 teams) in order to achieve the highest investment efficiency. The computer business game will allow participants to overcome the following factors:

1) *risk*, participants can experiment and see the impact of their decisions and actions in a safe environment and without any real world consequences;

2) *learning in the real world*, participants can gain an understanding of real situations in an authentic and exciting way before leaving the university;

3) *time, participants* can experience critical incidents such as interest rate changes, exchange rates, labor strikes, or even a global recession, which may not occur often in the real world or may not occur at your convenient study time during the course. In turn, students receive a manual (methodical recommendations) with instructions, a description of key terms and an explanation of key processes in the game.

The game is played over several weeks and each one represents the stages of business activity, a quarter in GMC and a semester in Gestionet. The roles of each team member are on the board of directors. Each student can choose to lead one or more departments, and only the CEO as a team leader is required. They compete with teams that sell the same products in the same market.

The game begins when the teams receive a company story about the firm they are going to run for, and they submit their first management decision (marketing, production, human resources, and finance) to the simulation via the Internet. Then, once the simulator analyzes and compares the teams' decisions, the teams get detailed results on the financial and operating conditions of their market. In addition, during the game, teams

receive other game documents that describe business and management situations and have the opportunity to buy market information that could help them make better decisions.

To facilitate learning, students have the opportunity not only to interact within teams, but also to participate in debates with peers who compete in other markets. In addition, instructors provide participants with information from previous competitions, such as videos or reports, and can arrange tutoring sessions.

Team performance can be tracked at any time:

1) a business game website where you can see the account of each team in the market;

2) the educational platform to which the debriefings are held must be loaded.

What is the purpose of creating team games:

First, to contribute to the acquisition of specific knowledge in the field of finance, the adjustment of the mechanic who presented the results to the students is replaced by the compilation of economic and financial reports taken as a reference, in particular, created by the company.

At the same time, a new progression mechanism was included to evaluate this activity as a practical part of the subject, which is expected to create new incentives for all participants, dynamics and emotions, and not only for those who received the best classification results.

Second, to support students and give them feedback, progress, textbooks on planning mechanics or classes for solving doubts at the collective and individual level have been revised, new online tools such as Teams and Zoom have been added. This was mandatory during the COVID-19 pandemic, but its use is expected to facilitate attendance in the future (dynamics) and help build interactive digital content such as discussion forums (emotions).

Mechanics — working parameters of the simulator; once defined, they remain constant for the duration of the simulator for any player. Research can examine three types of mechanics: tuning mechanics, the components that shape the ence experience; rules mechanics, define the goal of the game along with the behaviors and actions that are allowed or not allowed to achieve that goal; and the progression engine, tools that are included in the game to influence ence experience as it happens.

The mechanics used by the teaching team are based on two elements: the design of the chosen simulator and the purpose of the subject. First of all, choosing a simulator involves accepting some rules of the game and some rigors. Thus, mechanics depends on the offer of simulators on the market and the conditions of use they offer (Table 4.3). For example, the GMC is a free regional competition for students and teachers cannot choose the period in which it takes place, and students who get the best results have the opportunity to continue the competition later in non-subject phases. However, Gestionet has a university price, but is used in a closed format for course students that allows for course planning and includes a study round.

Table 4.3

Settings, rules, and development mechanisms defined by game developers to connect to the MDE framework

Tuning mechanics	Gestionet	GMC
Virtual with access outside the classroom	x	x
Variable participation	x	x
Team building among students	x	x
Randomly determined competitive markets	x	x
Rivalry against teams from other universities		x
Availability of elimination rounds		x
Rules of mechanics	Gestionet	GMC
Management of initially identical companies	x	x
Entering decisions on a web page	x	x
Cumulative decisions	x	x
The generation of results depends on one's own decisions, competition and the general evolution of the market	x	x
The need for consensus in teams	x	x
Weekly solutions for several weeks	x	x
Mechanics of progress	Gestionet	GMC
Classifications (Investment efficiency)	x	x
2nd level classification (assets, share price)		x
Best rounds at regional, national and international levels)		x
International tourism award for representing the country		x
Certificate of attendance	x	x
Networking opportunities for successful players	x	x

Then, to implement activities in the classroom, the teacher of the team presents additional mechanisms aimed at improving hard and soft skills (Table 4.4).

Table 4.4

Settings, rules, and progression mechanisms defined by professors according to the MDE Framework

Tuning mechanics	Gestionet	GMC
Information for students and promotion of the simulator	x	x
General presentation in the audience/ online (scale, teams)	x	x
Publication of success stories of previous winners		x
Interactive digital content (videos, articles, examples)	x	x
Rules of mechanics	Gestionet	GMC
Participation is mandatory		x
Presentations representing the board of directors		x
Submitting a financial report	x	x
Mechanics of progress	Gestionet	GMC
Answers to the doubts of the simulator developers	x	x
Survey of participating students	x	x
Questions in online tools (teams, forums...)	x	x
Creation of alumni communities for knowledge exchange		x

The implementation of technologies in classes is aimed at pre-training students for better access to the labor market. To assess the alignment of simulation learning outcomes with market needs, it was analyzed using survey data conducted by the Association for the Advancement of Management (APD) in the last quarter of the reporting year.

This data collects the desired level of competencies according to the opinion of people with different levels of responsibility of companies for entrepreneurs and managers. This survey consisted of 40 questions divided into nine categories:

1. Commerce, marketing and strategy.
2. Management.
3. Languages and international culture.
4. IT and digitalization.

5. Innovation, development and creativity.
6. Environment, Compliance and Risks.
7. Production, supply chain and logistics.
8. Soft Skills.
9. Technical.

Respondents rated each question as follows: (1) NS/NC, (2) not necessary, (3) not very necessary, (4) necessary, (5) very necessary, and (6) essential.

Therefore, the tools of descriptive statistics and categorization of variables were used to test the usefulness of computer business games in higher education. This analysis also broke down the formation for the companies according to the different levels of engineers hired and the positions of the managers studied. Studying the various benefits of general, human resources and operations managers.

Gamification is, first of all, a technique for changing human behavior, because it is based on the analysis of human behavior, as well as the methodology of correct motivation, which comes from the analysis of the behavior of a given person. Gamification is increasingly used in education and there is no doubt that it will also impact our schools and universities. If we can harness the energy, motivation, and potential of gaming and channel it into learning, then gamification of education will help give students the very important tools to achieve real-life victories.

Therefore, the computer business game is one of the unique methods of learning in higher education institutions that helps students overcome uncertainty, so its use is very important in the learning process. A computer business game has many possibilities and characteristics, as it is a model of communication, assumes the strengthening of the personal involvement of the participants in everything that is happening, contributes to the expansion of the associative base in the process of assimilation of the material, contributes to the formation of educational cooperation and partnership.

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4.3. Digital technologies in accounting as a basis for the training of a competitive accountant specialist in higher educational institutions

In the conditions of the development of the information society, there is an active digitization of socio-economic processes, including accounting activities. An integral feature of digitization is the wide implementation of information technologies in the activities of business entities, state authorities, local governments, educational institutions and the public. The automation of business processes has not left aside accounting. New tasks in the management of business entities contribute to the formation of specific requests that require appropriate accounting and analytical support. The development of accounting under the conditions of digitization of socio-economic relations is mostly connected with the introduction of IT tools and technologies aimed at overcoming the shortcomings of the existing control, analytical and accounting system.

The active implementation of digital technologies in the accounting system affects not only the principles of its implementation, but also the accounting profession. The basic competencies of knowledge of state and international standards of financial reporting, legislative norms and regulations require accountants to possess specialized software, familiarity with special IT solutions. Since the educational training of an accountant is primary in the formation of his future professional worldview, an important issue is the use of digital technology in accounting in the process of training a competitive specialist accountant in higher educational institutions. It is necessary to train accountants, actively implement digital technologies at enterprises, develop a legal framework, and solve problems that arise in the implementation process.

From year to year, the profession of accountant is included in the ranking of the ten most popular professions in the labor market of Ukraine. A wide