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GAMIFICATION IN MANAGEMENT EDUCATION

Gamification, which uses the mechanisms of games to acquire knowledge and various types of skills to build people's involvement in a specific activity, is playing an increasingly important role. This study aims to emphasize the importance of gamification in the management process, with particular attention to its use in the educational process. It employs a critical literature review, observation, and case studies, containing an analysis of active gamification-based methods used in teaching management (organization and management) and production management. On the basis of the pilot program MANAGER BOB IN, the game used during the production management course, and the experiences of the authors of the study in creating various games, it can be concluded that it is necessary to allocate more time during organizational classes to explain the principles and benefits of participation in gamification, and to extend the time for the implementation of selected challenges. Information feedback is also important, as is the use of various technical solutions that affect the attractiveness of games and the entire educational process.

Keywords: gamification, game mechanics, management, education.

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1. INTRODUCTION

Gamification has been recognized as one of the greatest, innovative discoveries of modern management due to its interdisciplinary and dynamic features (Wanick, Bui, 2019). Companies increasingly recognize the opportunities offered by gamification. They use them in various areas of management (entrepreneurship management, finance, projects, production, logistics, human resources, risk, etc. – Wanick, Bui, 2019) to motivate, develop cooperation in teams, also check certain skills and competencies of people, to encourage or dissuade them from certain behaviours (Widawska-Stanisz, 2017). Despite the proven positive impact of gamification on teaching and learning, and on the attractiveness of classes, there are few studies in the literature on the effectiveness of the use of gamification in the teaching process regarding also management courses. To address this problem, the subject of the study (both theoretical considerations and completed research) is gamification, especially its use in management courses. The article aims to emphasize the effectiveness and attractiveness of gamification for young people studying at the university level. Theoretical considerations were supported by case studies in which positive and negative aspects of the use of games in teaching management (organization and management) and production management were included.

2. GAMES AND GAMIFICATION IN THE LEARNING PROCESS

Gamification is the use of game elements in other than game contexts (Herzig, Ameling, Wolf, Schill, 2015; Rosli, Khairudin, Mat Saat, 2019). It means the implementation of the structure and mechanics of games (points, badges, levels, challenges, rewards) into the real world to arouse users' engagement, change their behaviour and solve various types of problems. It is a conscious and deliberate use of mechanisms used in the design of games, loyalty programs and behavioural economics assumptions in business situations to activate, influence the behaviour and motivate a selected group of participants.

Gamification, next to the elements typical for the gaming environment, also includes a specific way of solving problems, taking into account, for example, performing certain activities, taking up challenges, scoring points, etc. Importantly, it uses certain psychological elements that make games so engaging that they have become an integral part of social life. The very idea of gamification is based on the sense of fun that people feel while doing activities related to their work – business, healthcare, sports, education, etc., so those in everyday life seem tedious, monotonous and overwhelming. This change in approach results from the modification of their behaviour and motivation – they want to do this activity because it is attractive to them, and they want to get a prize, beat another gamer, or receive a medal.

Although the application of rewards, loyalty programs and elements of game schemes has been used in business activities for a long time, the gamification method was described and presented in detail in the United States only in 2010 (the term "gamification" appeared a little earlier, it was first used in 2002 by programmer N. Pelling). That's when websites began to appear that introduced elements familiar from games to their sites to diversify and attract an audience. In the same year, G. Zichermann's book *Game-based marketing* was published, thanks to which the author became one of the main experts in the field of

gamification (Kozłowska, 2016)[8]. In Poland, gamification began to be discussed more widely in 2012, when the first publication of P. Tkaczyk in this field – *Gamification. How to apply game mechanisms in business activities* – was published. The author formulated an interesting definition of this concept. In his opinion, gamification is "injecting fun into activities (such as work, getting up in the morning, saving for retirement or studying) that are not normally fun" (Kozłowska, 2016).

Each gamification project comprises three elements: dynamics, meaning a repetitive series of interactions between mechanics and rules of the game (Petrovich, 2017), game mechanics and plot. Gamification should also meet strictly defined criteria (Widawska-Stanisz, 2017):

- have and achieve a previously set goal – e.g., lead to an increase in product sales or convince drivers to reduce speed on the roads,
- contain emotions – it is to make fun, pleasure and give satisfaction from the designated activities,
- use mechanisms known from games – e.g., rewarding, providing feedback, competing, winning, elements of surprise,
- relate to real-life activities that are not normally related to games,
- increase people's motivation to perform certain activities.

The main didactic goal of universities is the possibility of obtaining education by students. For this purpose, various forms of acquiring knowledge are used, e.g., "giving", in which the student receives ready-made knowledge provided by the lecturer, e.g. lectures, descriptions or speeches, and "searching", "heuristic", i.e. one in which knowledge is gained through self-made work, these are m. among others, discussions, laboratories, exercises (Wiśniewska, 2017). The form of "searching" is gamification, which is also an important tool supporting the work of teachers' and students' learning. First, it gives them greater opportunities to use high-quality educational resources, thanks to a user-friendly interface, adding aspects of social interaction and using motivational gamification mechanisms (Niu, Luo, Niemi, Li, Lu, 2022). Higher education responds to calls for modernised teaching and the need to integrate more practical elements of everyday life into students' learning processes through the use of simulation games (BSG) (Zervas, Kostopoulos, 2023).

When deciding to start education at a university, students pay special attention to the method and manner of conducting classes. In the case of management courses, they focus mainly on whether the classes will provide them with practical knowledge that will enable

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[8] Development of the gamification in business was directly linked to the activities undertaken by companies such as Badge Ville and Bunchball, that have incorporated elements of games into management. One of the first companies to use gamification mechanisms in the recruitment of personnel was French tycoon of the cosmetics industry – L'Oreal. In 2010, the company created the game Reveal L'Oreal, intended for students and graduates of universities of various faculties. Its aim was to help discover the professional profile of each gamer and to choose the right career path. Another interesting idea of recruiting employees was proposed by a personnel consulting company Hays Poland. By means of Facebook game it decided, through a recommendation system, to look for people willing to cooperate in shared service centers. Users whose Hays called recruiters used international forums, thematic blogs and discussion groups to find candidates. The best could use internship or full-time position. The gamers played the role of NASA agents who search for candidates to settle the Earth. The application was supposed to build tension caused by the threat of the entire globe. The recruiter fulfilled subsequent missions and recruited new people, while the candidate filled in an on-line form (Wrona, 2013; Widawska-Stanisz, 2017).

them to work in the future, e.g., in the profession of a manager. For this reason, it is necessary to constantly modify the didactic process and make the forms of the knowledge transfer process more attractive. Using diverse teaching methods allows for better understanding, memorization of gained content and improvement of student activity within classes (Janecka, Juźwik, 2020; Zatwarnicka-Madura, 2016). For these reasons, gamification using simulations and augmented reality is becoming more and more popular. They are now almost universally used at all levels of education.

Gamification is an innovative technology (Rosli, Khairudin, Mat Saat, 2019), but also a teaching method based on new educational technologies (Grivokostopolou, Koras, Perikos, 2019), which allows shaping certain behaviours and learning by doing. It increases knowledge, experience, motivation, perseverance and commitment to the tasks carried out, and has a positive effect on self-efficacy (Rosli, Khairudin, Mat Saat, 2019). It changes activities that are difficult or unpleasant into activities that encourage engagement, creating fun out of something that does not resemble it (Złotek, 2019).

Educational games have been developed and are used to improve the teaching and learning process helping both students and teachers achieve their goals (Silva, Rodriges, Leal, 2019). Game-based education takes two forms: gamification, in which learning is transformed into a game, and Game Based Learning (GBL), by incorporating real play into the learning process (Al-Azawi, Al-Faliti, Al-Blushi, 2016). Social and cultural changes, new technologies and the development of artificial intelligence affect the demand for employees with high competencies, to go beyond the box and perceive reality from different perspectives (Fazlagič, 2019). Gamification gives the freedom to choose a solution to the problem, the system of quick feedback on success or failure used in it increases motivation to learn and allows you to create new ideas and alternative approaches, which help solve problems, encourage the choice of new solutions (Bühler, Jelinek, Nübel, 2022).

Games are effective teaching methods referring to the real world, which are a substitute for real actions and decisions in the real world. For this reason, education may be very effective with the assistance of various business games that simplify economic reality (Gaweł, 2016). You can, for example, become a virtual entrepreneur (learn in practice how to run a business), play managerial roles (Deterding, 2018), and solve problems that an entrepreneur or a manager may encounter when doing business. Research indicates that entrepreneurship education with the use of gamification increases the likelihood of starting their own business for young people (Nowiński, Nowaczyk, Sobczak, Tomczyk, Fabiś, Litawa, 2016). In entrepreneurship education, virtual strategy gamification is very effective. On the one hand, they require gamers to use their existing knowledge, skills and experience – they decide during the gamification, based on already possessed qualifications. On the other hand, commitment is necessary to carry out the gamification, because they are the active actors, discussing, analyzing possible options, making decisions and examining the results of their actions. They ask questions about the most effective market strategy and independently search for answers, which shape their cognitive process (Gaweł, 2016).

Because of its popularity, the use of gamification has been the subject of numerous studies (Yasin and Hafeez, 2018), which highlight its effectiveness in the teaching process.

The results of a systematic literature review show a growing interest in gamification and game-based learning (e.g. Dečman, Rep, Titgemeyer, 2022; Jääskä, Lehtinen, Kauppila, 2022; Kamarudin, Halamy, Mohsin, 2023; Grijalvo, Segura, Núnez, 2022; Bohan, McDowell, Smyth, 2022; Ortiz-Martinez, Santos-Jean, Palacios-Manzano, 2022).

Both forms are increasingly used in various areas of exact and social sciences (Subhash, Cudney, 2018). Progressively, they are used in higher education to teach management[9]. They concern various areas of enterprise management, for example, entrepreneurship of management and employees, managerial skills, and managerial decisions. Computer simulations are often used to prepare for company management, helping to prepare for the future role of managers or entrepreneurs (Silva, Rodriges, Leal, 2019). Using gamification at universities also results from the fact that it can be very effective, especially with young people who spend a lot of time in virtual reality (e.g., generation Y, Z). Gaming-based education can be attractive to them, arouse more interest, influence engagement, and gain knowledge in this way can be much more effective (Isabelle, 2020). The didactic process, supported by gamification, takes into account and integrates the essential components of this process: cognitive, operational, exercise, and facilitation (Wasyluk et al, 2020) positively affecting the attractiveness and effectiveness of games.

Currently, a big challenge in the didactic process is to support the development of critical thinking and maintaining a constant, high level of attention and focus of students, who often have problems with overstimulation, rapid exposure and exposure to constant distractions. Hence the need to introduce digital technologies into the education process that are attractive and engaging for the recipient and ensure the achievement of educational goals (Boboc, Băutu, Gîrbacia, Popovici N., Popovici D.M., 2022).

Didactic games are aimed at mapping a specific situation, or reality, to enable participants to influence a system. This allows you to create a certain vision so that gamers will experience a specific problem and directly interact with it. Students who have used gamification in the educational process improve academic results than those who have not used them (Ortiz-Martínez, Santos-Jaen, Palacios-Manzano, 2022). This is evident in the situation related to the pandemic and the change in the way of teaching (mainly remote), which has made teaching and learning more tedious and less motivating. In distance learning, the use of gamification can be easily implemented and thus can positively influence the teaching and assessment process of students (Ortiz-Martínez, Santos-Jaen, Palacios-Manzano, 2022). Teachers also see the beneficial consequences of gamification for students, such as increased interest and learning along with an unforgettable learning experience (Jääskä, Aaltonen, 2022).

3. GAMIFICATION CASES ANALYSIS APPLIED IN MANAGEMENT AND PRODUCTION MANAGEMENT

The study focuses on a qualitative approach using observation and case studies. This aims to explore and describe the environment to better understand it (Alotumi, 2022). Examples of those classified as active 'learning by doing' teaching methods using gamification to focus on the learner and acquire industry-specific competencies were used. The study is based on two examples of gamification applied by employees of the Rzeszów University of Technology – the first one is used in management (organization and management) classes, in logistics as well as internal security at the Faculty of Management, the other one in production management classes in management and production engineering at the Faculty of Mechanical Engineering and Aviation.

The effectiveness of the use of gamification in didactics in management sciences and quality has been confirmed by the experience from implementing the author's pilot project

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[9] The first game played in these courses was Monopoly. Over time, more and more of them appeared.

entitled "Program of gamified courses Management/Organization and Management (2022/2023)" (in short *Program*), developed and implemented in the Department of Enterprise Management at the Faculty of Management of the Rzeszów University of Technology in the winter semester of 2022[10]. This offer was addressed to students in the first year of first-cycle studies in two stationary and two non-stationary directions. The gamification, symbolically named MANAGER BOB IN, is based on a canvas from the construction industry, determining the name of the whole gamification. Its essence is summarized in the introduction (INTRO) of the *Program*:

> You are a manager focused on personal development, looking for new opportunities and open to inspiring challenges. Your current goal is to build your dream home. To achieve this, you must own currency (B&B), i.e., bobucks. You earn these funds by completing tasks that appear at various stages of the construction process. The dream goal gets closer to implementing subsequent challenges. You can observe your progress actively, experiencing more and more satisfaction from overcoming weaknesses and emerging problems. Complete quests, earn B&B and expand your knowledge in an exciting adventure full of interesting surprises.

The description quoted above fulfils three functions:
- motivates to participate in the gamification by referring to individual motives for studying (methodically diagnosed at the preparatory stage of gamification),
- formulates the goal of the gamification,
- indicates the means and principles of achieving the objective.

The structure of the gamification was subordinated to industry phraseology, defining the so-called construction plan with the following stages:
1. Literature analysis and process coordination.
2. Searching, negotiating and buying your dream plot.
3. Obtaining building conditions for the plot.
4. Purchase of the prettiest house design.
5. Adaptation of the project and land development of the plot.
6. Obtaining a building permit.
7. Building a house.
8. Notification of completion of construction and consent to use the building.

The above positions were organized in a series-parallel system, visualized on the Gantt chart. This gave the opportunity to simultaneously implement selected stages, and completing each of them was tantamount to completing one challenge (task). The gamification included two types of challenges: basic (i.e., obligatory, resulting from the standard study program) and premium (i.e., voluntary, enrolled in the pilot *Program*). Basic tasks were performed and completed during classes by the Gamer (student), playing the role of MANAGER BOB IN, while premium tasks went beyond contact hours. The game schedule specified the time slot (one, two or three weeks) during which premium challenges were active. This meant that their execution, and at the same time the earning of points, was possible at any time, albeit within a strictly defined period, counting from

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[10]   The program is available at (https://bozydarziolkowski.v.prz.edu.pl/materialy-do-pobrania/
  gamifikacja).

the moment of making the detailed instruction available until the end of accepting tasks. Due to the optional nature of the gamification, similar personalization concerned the number of challenges undertaken, the so-called "moment of entry into the gamification" and the scope of their implementation. For certain premium challenges, there was a registration requirement. It was conducted at the beginning of a given stage by two employees of the university unit, appointed in the gamification as DESIGNER and CONSTRUCTION MANAGER. This was to provide Gamers with tailored information. The scoring system developed in the game MANAGER BOB IN was based on the currency, which was bobucks (B&B). Gamers won them in three categories, i.e.:

- readiness to join the basic challenge – reflected in the presence at classes (lectures and exercises),
- implementation of the basic challenge,
- Implementation of the premium challenge.

Delay in completing the basic task (i.e., its completion after the exercise) allowed you to get a maximum of 80% of the currency provided for the challenge. Getting 100% of the number of bobucks for all basic tasks entitled the Gamer to obtain a passing grade without taking the colloquium from classes. With above-average implementation of premium challenges, Gamers received additional points, so-called surprises (which are the equivalent of prizes). The aggregate results of all Gamers were published on the gamification page before its completion. The scoring scale used for individual stages together with the results is presented in Table 1.

Table 1. Rules for obtaining currency and scores in MANAGER BOB IN gamification

Percentage of B&B	Total B&B	Stages/challenges/tasks	Scores	
			Exercise	Exam
50%	-	Basic challenges	3,0	-
60%	50% + 10%	BOB IN fieldwork	3,5	-
70%	50% + 20%	BOB IN in the Eisenhower matrix	4,0	-
80%	50% + 30%	BOB IN – pioneers' stories	4,5	-
90%	50% + 40%	BOB IN evaluation	5,0	3,0
100%	50% + 50%	BOB IN ICAN	5,0	3,5
110%	50% + 60%	BOB IN SPIRATOR	5,0	4,0
120%	50% + 70%	BOB IN - Ishikawa chart	5,0	4,5

Source: own work.

To avoid the impact of objective factors (i.e., affecting the course of gamification of days off from classes) – which randomly differentiated the number of points obtained for basic tasks between individual groups of stationary studies – percentages were used in the above scale.

The last part of the gamification *Program* describes the premium challenges. Its standardized form included: the deadline, distinctive name of the challenge (given in Table 1.), task topic, information about the required registration, information about the type of results of the challenge, detailed instructions for completing the task, inspirations (literature), as well as useful tools (e.g., software, databases).

The results of the pilot gamification *Program* provide the basis for assessing student involvement in terms of three criteria, i.e., the field and form of studies and the type of

challenges. To assess the involvement of the Gamers in the context of the field and form of studies, the calculations presented in Table 2 were made.

Table 2. Participation in MANAGER BOB IN gamification due to the direction and form of study

Field of study	Logistics		Internal security	
Form of study	Stationary	Non-stationary	Stationary	Non-stationary
Number of classified persons	110	21	111	31
Number of gamification participants	22	7	33	0
Percentage of Gamers	20	33	30	0

Source: own work.

Involvement in gamification was also assessed based on the type of challenges undertaken, as shown in Table 3.

Table 3. Participation in MANAGER BOB IN gamification due to the type of challenges

Challenge/task name	Percentage of Gamers
BOB IN fieldwork	15
BOB IN in the Eisenhower matrix	87
BOB IN – pioneers' stories	23
BOB IN evaluation	58
BOB IN ICAN	50
BOB IN SPIRATOR	35
BOB IN - Ishikawa chart	52

Source: own work.

Based on the presented results, the analysis of the effects of implementing the MANAGER BOB IN *Program* leads to practical methodological and substantive conclusions. From the point of view of the methodological effects of implementing the *Program*, it was found:
- relatively low interest of students in the presented teaching method – 23% of people expressed their involvement (when considering all university directions),
- significant differentiation of students' involvement due to the field and form of studies, as well as the exercise group,
- the grade of the commitment to the gamification was translated into final results, i.e., the greater the commitment to implementing premium challenges, the greater the number of points (B&B) earned.

However, the assessment of the substantive effects of implementing the *Program* led to the following conclusions:
- the challenge of telephone contact with enterprise managers was taken up by 15% of gamification participants, which shows the high difficulty in the designed task,
- challenges with low difficulty and creativity (to record an individual daily schedule) involved most gamers (87%),

- challenges requiring the acquisition of new competencies (e.g., the use of IT tools or the creation of an original concept) involved fewer Gamers than tasks based on the use of existing knowledge and skills (e.g., in working with text or in preparing a presentation).

Based on the conclusions formulated after the analysis of the results of the pilot MANAGER BOB IN program, it is possible to recommend:

- allocating more time during organizational classes, for students of the first year of each field of study, to explain the principles of implementation and benefits of participation in gamification,
- conducting a student satisfaction survey and presenting its results during organizational classes,
- extending the time of implementation of selected challenges.

Another example of gamification at the Rzeszów University of Technology was introduced into the production management course, based on the learning-by-doing approach in teaching Lean Manufacturing. Its origins date back to 2011, when, because of the implementation of an international project, the Lean Learning Academy Poland was created at the Faculty of Mechanical Engineering and Aviation, which, among other things, develops various types of didactic gamification. In the developed interactive gamification of production management, students – its participants – play different roles, and the behaviour of one person affects the actions of others. They have to achieve a specific goal and achieve the assumed level of efficiency. An attempt was made to recreate as much as possible the real conditions prevailing in the working environment, occurring on the assembly line. In laboratory conditions, this is difficult, so it was necessary to apply several simplifications but tried to reflect as much as possible on what is happening in the enterprise. The gamification is performed at master's degree studies (students already have the title of engineer), because to carry it out it is necessary to have basic engineering (theoretical) knowledge of participants in, for example, production organization, production management, technology design, risk management, quality assurance, signing contracts, training and employee motivation, methods and tools in the field of Lean Management (Stadnicka, 2017).

Students take part in a gamification that is a simulation of a certain part of the company's assembly line, and their job is to assemble pens. It is a very simple construction, which – as it seems – should not create the slightest problems. The implementation of the gamification shows, however, that in the assembly process, students make several mistakes for which they take responsibility, try to solve them and can learn a lot during it. Depending on the recipient's expectations, a decorative element (e.g., a sticker) is also mounted on pens. The gamification makes you aware of how the additional process can hinder the work, and how the addition of a small element can affect the course of the whole process. This is to teach students what ways to use to make the assembly line efficient, but also as flexible as possible according to customer requirements. When creating the gamification, the assembly of a very simple product was deliberately chosen, because its goal is not to teach students how to assemble pens but to organize production (work) when assembling any product. It was also about teaching them what specific tools to use, what methods should be used, and what changes should be introduced to improve the organization of work on the assembly line.

Each participant in the gamification is employed in a specific position depending on the predispositions and abilities assessed by the gamification coordinator. Everyone is

given tasks to do, and their work is assessed and controlled. On the assembly line they work (Stadnicka, 2017):

- operators – who perform assembly tasks following the working documentation with the instructions received; they receive training that provides them with information on how to assemble pens;
- controllers – responsible for the inspection of finished products; at least one controller at the end of the assembly line takes part in the gamification (this was a deliberate action so that students themselves would realize the importance of control at each stage of the assembly so that they would see the importance and effectiveness of self-control);
- warehouse employees – who are responsible for internal logistics, their task is to deliver to the stations' elements necessary for assembly and receive finished products;
- production manager – commissioning production tasks, responsible for the implementation of the assumed number of finished products that meet the customer's requirements, also for achieving a certain level of efficiency;
- process engineers – who observe assembly processes, identify problems, and collect relevant data using tools of their choice; are responsible for the timing of working time, and record activities performed by operators; during the process, they can not interfere in any way in the work of contractors, in the functioning of the production line, they only observe its work.

The gamification is divided into several steps (stages) (Stadnicka, 2017):

- Step 1 – informing everyone what they are responsible for, conducting operator training, starting the assembly process – supervision over the game is taken over by the production manager, who is responsible for the whole; the teacher becomes an observer, and from now on the manager handles the whole, solves emerging problems;
- Step 2 – process engineers become active and summarize what happened on the assembly line; each participant of the gamification (employed in the production process) can comment on what problems have arisen, what bothered him at work, what he had the greatest difficulties with; all reported problems are then collected, grouped, the most important of them (e.g., 3 or 4) are carefully analyzed, and the participants of the gamification are looking for the best way to solve them; for this purpose, teams are created – each of them deals with solving one problem; students create teams themselves, realizing that the criteria for selecting team members should be substantive (and not result, for example, from mutual sympathy) to solve the problem; each team pursues its own goals, but they can be related to the goals of other groups, therefore they must communicate with each other, set priorities, cooperate; teams use familiar Lean Manufacturing tools to help solve the problem; prepare an A3 report for their problem – propose a solution to be implemented to solve the problem, to improve the assembly process;
- Step 3 – the proposals developed by the teams to solve problems arising on the assembly line are then implemented; this is to improve the work of operators on the line; students can change the location of workstations, make corrections in the instructions for performing individual operations, change the flow of materials used for assembly, also the flow of information, eliminate losses, change workload, etc.;

- Step 4 – students organize a new assembly line, taking into account the improvements and corrections they report; new assembly conditions usually bring a huge leap in efficiency, which is to make students aware of the consequences of mistakes made and the effects of the changes introduced;
- Step 5 – evaluation of the introduced changes, summary.

After completion, students focus on other problems that arise in new conditions and evaluate the effectiveness of the changes made. A big surprise for them is a huge (often even 800 or 1000%) increase in the efficiency of the assembly process after implementing the corrections. They realize then that often there is no need for cost changes, large financial investments to improve work, to improve the conditions and organization of production. They know that there are no shortcuts and that every activity must be done correctly and within a specific time if it is to ensure a certain level of efficiency and quality.

The described gamification develops competencies in teamwork, responsibility for decisions, motivation, cooperation and interaction, sharing knowledge and information, identifying problems and searching for ways to solve them (Stadnicka, 2017). The leaders of the gamification each time assess its effectiveness, checking the level of students' knowledge before and after its completion. For this purpose, knowledge tests are used, which show that implementing the game increases the knowledge of students. Average scores are higher each time after the gamification cycle.

4. DISCUSSION

From the perspective of the analysis of the literature on the subject and the experience of the authors of the study during the use of games in the didactic process, it is worth emphasizing that designing an engaging teaching and learning process are equally important aspects that should be taken into account. Based on the analysis of various games, it can be concluded that the attractiveness of the challenges and accompanying components plays a very important role, i.e., the method of developing didactic content and choosing the right medium. It is also necessary to take into account the design features of the challenges such as the level of difficulty and complexity associated with the implementation of the task and time consumption. Also, the scenario of the game, and subsequent challenges, should be adapted to the planned duration of classes, topics and didactic goals. It should contain a sequential network of tasks, in which dependencies between activities determine the order of their execution, engage to take on the next challenge through properly thought-out elements such as:

- division of content into smaller task packages, properly compiled in terms of the scope of knowledge provided and its implications, and thus easier to assimilate by the student, taking into account the time of his highest attention span,
- the use of various forms of transmission of didactic content in a cognitively attractive way,
- taking into account the student's preferences and interests e.g., through the possibility of individualizing the designed tasks, leaving a certain level of freedom of action in choosing the preferred methods of implementation,
- appropriately selected optional challenges, which should support the individual motivations of participants and thus stimulate them to deepen their knowledge.

Another element is the attractiveness of the learning process, which results in the involvement of the student in a way that includes support in new, difficult and ambiguous situations. At the same time, it should be cognitively attractive and engaging to take up and

continue the challenge, regardless of the emerging distractors. This is to introduce the student to a state defined by the concept of *flow,* which is something between satisfaction and euphoria, caused by total dedication to a specific activity. During this state, the participant experiences concentration on the task, active control accompanied by a combination of action and awareness, loss of self-awareness, and distortion of the experience of time. The implementation of the task becomes the only necessary justification for its continuation (Mihaly Csikszentmihalyi, 2008).

A very important element is communication, i.e., the way of establishing contact, receiving feedback or providing support by the lecturers, considered in the aspect of synchronicity and asynchronicity. The traditionally accepted form of asynchronous communication should be assessed as a potential inhibitor of engagement. Consideration should be given to introducing solutions using a synchronous form of communication, i.e., one that always provides appropriate feedback at the right time, giving a sense of its adequacy to the effort put in. In a similar aspect, the availability of further challenges for students should be assessed, which may affect the disruption of the *flow* state, a key element of the engagement-building process.

In the game design process, the interaction and communication between students should be properly thought out and designed, which further reinforces the feedback loop and thus maintains engagement at the appropriate level. To improve this process, it is recommended to shorten the waiting time for the opportunity to take on the next challenge and, if possible, automate this process. Bearing in mind the availability of various tools, it is worth taking into account the preparation of a course or its part on an LMS (Learning Management System) platform, e.g., Moodle and using, for example, quizzes as a form of assessing the acquired knowledge.

Based on the diverse experience of the authors of the study (also referring to the creation of various games), observations and case studies described in the literature, it can be concluded that gamification is a complex process and should not be limited only to superficial elements, such as the implementation of points, badges and scoretables. Based on data obtained during the evaluation of courses and many years of experience in game design of one of the co-authors of this study, the following factors building students' involvement in the learning process were identified:

- ludic experience – which is built by introducing such elements as, m.in. plot or balancing the degree of difficulty of the game,
- the possibility of satisfying socialization needs through various forms of cooperation and interaction in the group,
- cognitive competence of the process – through appropriately developed didactic materials that will be cognitively attractive and will respond to the needs related to assimilation, learning and searching for new knowledge,
- psychological aspects that keep the student in a state of flow, giving a sense of agency, as well as feedback and gratification, which directly affects the sense of effectiveness.

The above elements are used in the process of designing games to provide the recipient with specific emotions associated with a certain type of activity (Wesołowski, 2016). The potential of games can therefore be successfully used in the education process, supporting taking up the "challenge" by emphasizing the flow state, properly balancing the difficulty of the game concerning the student's skills and introducing such elements as choices, puzzles, missions, narrative development and interactivity. Games activate the

development and improvement of cognitive competencies, which include a wide range of skills, such as: cognitive flexibility, critical thinking, creativity and logical reasoning, as well as solving complex problems (Karwańska, 2022; Guo, Li, Guo, 2021).

The experience of game design practitioners allows us to formulate conclusions regarding the effective implementation of the gamification method in the teaching and learning process. Therefore, it is necessary to distinguish certain stages in the process of designing a gamified course, which leads from setting didactic goals and the corresponding scope of knowledge, through designing the game, to effectively integrating subsequent mechanisms of the game into the didactic process. The first related to the implementation of didactic goals relates to the scope of knowledge that the student should master with the format of its presentation. Didactic purposes should be accompanied by dedicated content (multimedia) or other supplementary materials. The result is a cohesive educational solution that tailors game complexity and challenges to a given context.

The next stage is to choose the form of the game and the right tools. Linking in-game activities to learning objectives and real-life situations is provided by a well-designed plot and narrative, context and events that enable you to understand the real implications, and practical relationships of knowledge with the context of its application. The key element is to achieve and maintain a state of *flow*, which should be supported by the selection of a systematized game design methodology. To gamify the course, one of the frameworks can be used, in particular: MDA (Hunicke, LeBlanc, Zubek, 2004), GSF Application Model (Klapztein, Cipolla, 2016), Octalysis (Yu-kai Chou 2015). One of the commonly used is the MDA (*Mechanics, Dynamics, Aesthetics)* framework*,* which distinguishes the following components: rules, system and play, and establishes their design counterparts i.e., mechanics, dynamics and aesthetics. Dynamics describes individual components at the level of processed content and the mechanisms behind it, dynamics describes the reaction of mechanics to the interaction of the participant during the game, and aesthetics describes the desired emotional reactions such as: following, challenging, fabricating, expressing, narrating, discovering, sensation and bonding, evoked in the player when interacting with the game system (Hunicke, LeBlanc, Zubek, 2004). The gamified course should be based on a gameplay loop, creating feedback loops between Goal – Challenge – Reward. At the same time, the goal should be formulated by the SMART principle, the challenge should be balanced and diverse, and the reward should give satisfaction exceeding the effort put in and be meaningful to the participant.

A well-designed game supports the learning process and in this sense is an effective method to support motivation, increasing the student's involvement in the learning process through persuasive, emotional and cognitive elements. When designing gamification, it is worth taking into account, among others, such elements as a gratification system, selection of appropriate forms of engagement including an engaging plot and an interestingly conducted narrative, building habits, varied challenges, embedding the game in an interesting universe, leaving space for freedom of action or self-expression by participants, inspiring to deepen knowledge in a given area and optional areas. Equally important are the elements that provide various types of aesthetic experiences.

5. CONCLUSIONS

Gamification has great potential, and the use of the game mechanism is very effective, especially with young people who are more willing to engage in tasks using game rules – it is an interesting, much more attractive form for them. Interest in gamification is growing,

which is undoubtedly influenced by the development of techniques and technology. Gamification and games are increasingly used at different levels of education.

Based on the analysis of the literature on the subject and based on the experience of people using games in the education process, it can be concluded that: they affect the level of involvement of participants (which was also confirmed by research by Thomas and Baral (Thomas, Baral, 2023); support the learning process; shape social interactions.

For centuries, the education system has been focused more on conveying ready-made messages than on shaping openness to change and innovation. Such a concept is useless in a changing and dynamic environment, in which adaptation and development consist not in the application of ready-made knowledge, but in solving constantly emerging new problems and anticipating problem situations (Sikorska-Wolak, 2010).

The article contains the most significant information on the importance of gamification in the education process. It was based on examples of gamification used in management (organization and management) courses and production management classes with students of the Rzeszow University of Technology. The main motives for their implementation were the desire to make classes more attractive, as well as to increase interest in the taught topic, and to arouse greater motivation and involvement of students in the tasks carried out. The analysis of the effects discussed in the development of gamification leads to the following conclusions:

- some of the tasks designed in the gamification were difficult, which resulted in less interest and involvement of Gamers,
- low-difficulty challenges and creativity involved most Gamers,
- challenges requiring the acquisition of new competencies (e.g., the use of IT tools or the creation of an original concept) involved a smaller number of Gamers than tasks based on the use of existing knowledge and skills (e.g. when working with text or preparing a presentation),
- significant differentiation in students' involvement was noticed due to the field of study and form of studies, as well as the exercise group,
- the degree of involvement in gamification translated into the final results of the gamers, i.e., the greater the involvement in the implementation of premium challenges, the greater the number of points earned,
- implementing the production management gamification contributed to better results obtained in the final tests,
- gamification makes you aware of the problems that may arise even with simple activities, but they teach you to be responsible for mistakes.

The implementation of the gamification programs discussed in the study in practice indicates the need to introduce some modifications that will certainly make them more attractive in the next cycle of classes. This includes, for example, the inclusion in the gratification system not only of rewards directly related to the activity but also a deferred "bonus" meaning additional pools of points e.g., for helping another student, which additionally stimulates interaction between participants and pro-social activities shaping transformative competencies. In addition to currency, it is also worth introducing other prizes, for example, unique digital artefacts, which are a reflection of the results achieved during the implementation of tasks (e.g., in the case of the discussed MANAGER BOB IN course, these could be varied house graphics, which are a representation of previously made decisions, as a consequence of commitment during the course – from a crumbling ruin in case of the weak grade, to an exclusive residence for the excellent grade). The diversity of

rewards, combined with various types of activities related to the didactic goals set, allows you to additionally shape skills such as: cooperation, creativity, teamwork, and entrepreneurship.

Each course should be accompanied by appropriate instructions, which before taking up the challenge explain the rules of the gamification to the student in the form of e.g., a presentation, a demonstration film or other interactive introduction, allowing them to learn the rules of the gamification. Learning the rules and mechanics of gamification requires extra effort from students, which can be felt as a burden. Therefore, the ideal solution, independent of having instructions in the form of a compendium, will be to weave it into the content of the course.

The gamification process is complemented by feedback, which fulfils important functions strengthening the learning process, such as assessing the progress related to mastering new knowledge, providing information about the success or, on the contrary, mistakes made along with their explanation. As part of the whole process, it introduces a coupling between effort and satisfaction, as well as the activation of knowledge and its supplementation. If feedback is given immediately after the end of the action, then it leads to the strongest link between the action and its effect. If there is a significant discrepancy between the action and the result, the player may not understand how his action affected the result obtained. At the same time, you should eliminate any unnecessary information that may distract your concentration. Feedback should be linked to the reward system. It is necessary to minimize those aspects of the game that affect the competition because, on the one hand, they can be a demotivational factor for some students, and on the other hand, they may not stimulate the development of cooperation skills. Each course should also be accompanied by dedicated evaluation tools, which allow for gradually improving the course in all its aspects.

Bearing in mind the preferred way of learning for digitally active young people, it is also worth emphasizing that every didactic process (not only the one using gamification) should absorb new technological solutions, which can be conventionally divided into two groups: supporting the teaching process and enriching the learning experience. The first one is aimed at engaging students in the didactic process, and their activation, such as gamification and accompanying solutions. The second one is to strengthen the motivation to learn also outside the time of classes. Technologies enriching the educational experience include those related to the immersive and interactive form of content presentation such as VR (*Virtual Reality*), AR (*Augmented Reality*), MR (*Mixed Reality*). The potential associated with the use of virtual worlds is based on an alternative format of perception and experience. In addition, the ability to enter the role of the hero (avatar), according to the scheme of J. Campbell's monomyth, allows you to go through a series of changes, finish the gamification with the identification of strengths and weaknesses and see the practical implications of knowledge in the real world. Augmented reality enriches the way of exploration by introducing elements of interactivity based on descriptive knowledge, visualization of application cases, and additional sensory stimuli. The current trend related to the use of digital learning environments, additionally supported by large language models (*Large Language Models* – LLM), should be emphasized. The basic functionality of the LLM, in the context of gamification of the course, can be used as a virtual assistant that provides the student with answers to questions in real-time, as well as helps in structuring knowledge or supports the teacher in preparing feedback for the student, after its prior verification.

The results of the analysis show that the use of active methods, including games and gamification, may bring benefits in learning management and production management subjects because they enable the use of tools consistent with real scenarios observed in companies. The results of the study encourage new research to further explore the use of gamification in education.

The examples in this study refer only to management courses, which may be a kind of limitation and the fact that, due to the small research sample, it is impossible to generalize conclusions. Despite the proven positive impact of gamification on teaching and learning, and on the attractiveness of classes, there are few studies in the literature on the effectiveness of the use of gamification in the teaching process and presenting students' expectations in this area. For this reason, there is a need for further qualitative research in this field using the experience of game designers.

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