

ANALIZA I PREGLED NOVIH IGRIFIKACIJSKIH OKVIRA U PRAKSI

ANALYSIS AND OVERVIEW OF NOVEL GAMIFICATION FRAMEWORKS IN PRACTICE

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SAŽETAK

Strategija igrifikacije uspješno se koristi u mnogim područjima za povećanje motivacije i produktivnosti te je stoga važan element uspjeha. Igrifikacija koristi različite pristupe, kao što su nagrade i razine, kako bi potaknula sudionike na aktivnije sudjelovanje u procesu. Ovaj rad opisuje igrifikaciju, njene elemente i načela te daje primjere njezine primjene u okruženju izvan igara sa sustavnim pregledom elemenata i teorije igrifikacije. Cilj je ovog rada pružiti uvid u najraširenije pristupe i okvire igrifikacije. Upoznavanjem s elementima igrifikacije i njihovim kombinacijama mogu se razviti različite strategije primjene kako bi se zadovoljile potrebe korisnika u mnogim domenama.

Ključne riječi: igrifikacija, nagrađivanje, okvir, MDA, octalysis okvir

ABSTRACT

Gamification strategy is successfully used in many fields to increase motivation and productivity and is therefore an important element of success. Gamification uses different approaches, such as rewards and levels, to encourage participants to participate more actively in the process. This paper describes gamification, its elements and principles, and provides examples of its application in a non-gaming environment with a systematic overview of gamification elements and theory. The goal of this paper is to provide insight into the most widespread gamification approaches and frameworks. By becoming familiar with the

elements of gamification and their combinations, different application strategies can be developed to meet the needs of users in many domains.

Keywords: gamification, rewarding, framework, MDA, octalysis framework

1. UVOD

1. INTRODUCTION

Gamification is the application of design elements and the game principles in contexts outside of games. [1] In other words, gamification is adding game mechanics in to environments that are not games, such as web sites, online communities or learning management system in order to increase engagement. The goal of gamification is to incite consumers, employees and students to cooperation, sharing and interaction. It has increasingly been used in business environments to improve motivation, engagement, productivity and work quality. [2] Also, it is widely present in many other parts of our life such as socialising and learning. [3], [4]

It can also be said that gamification is the process of designing activity transfer of all elements that make games fun and attractive into real or productive activities. In fact, it is the human-focused design, as opposed to „function-focused design“. It is a designing process that optimises human motivation in a system, as opposed to pure efficiency.

There are different approaches to gamification, usually based on awarding people for executing various tasks. For instance, a person gains points,

credits (or another form of virtual currency), achievements and badges. Levels are also used to show the progress of a person, with leaderboards to encourage other players to strive to better results. Gamification is discovering which elements and techniques make games so interesting, and then applying them in other fields where productivity is needed. Considering the importance of gamification and its wide application in numerous domains, this paper describes several approaches and frameworks for its application.

This research analysis gives an insight into various contemporary approaches, gamification framework and their application in different sectors. Special focus has been put on the research of various gamification frameworks and elements, and their combinations. Additionally, this paper reveals significant empiric evidence on the efficiency of the adaptive elements in the gamification context and the possibility of using the presented results as a means of improving everyday teaching activities.

2. TEORIJSKA POZADINA

2. THEORETICAL BACKGROUND

Playing games should be fun and create desirable experiences even in less interesting activities, increasing the intrinsic motivation and making the activities more pleasurable and attractive. [5] Well devised games can be used as learning tools which support deep and meaningful learning. [6] Today, the consensus widely spread in the literature is accepted that so called serious games (games which don't have entertainment as the primary goal) have a positive effect on learning and learning outcomes through engagement, interest and immersion. [7]

The importance of games and play in human learning and personal cognitive development dates back to the theories of Piaget and Vygotski and continues to be a subject of research, [8] which led to the establishment of an interdisciplinary field of game-based learning - GBL. GBL is specialised in studying the link and interaction between fun and games and is viewed as a type of game with defined learning outcomes. [9]

The term gamification was coined by Nick Pelling, British games programmer in 2003 [10], and it has

taken off since. [5] The most often used definition says that gamification is "the application of game design elements in non-game contexts." [5] A more detailed definition based on the outcome states that "gamification is using mechanics, aesthetics and way of thinking about games that are game-based to include people, motivate action, promote learning and problem solving." [11] Conceptually, gamification is clearly different from serious games and learning based on games because while serious games immerse students into a game and try to hide actual teaching goals, gamified lectures add one or more game elements (e.g., points, leaderboards or badges), with teaching goals clearly visible to the users. [12]

2.1. PIRAMIDA IGRIFIKACIJSKIH ELEMENATA

2.1. GAMIFICATION ELEMENTS PYRAMID

For the purpose of explaining gamification and what makes it so efficient, the Kevin Webach gamification elements pyramid is shown, consisting of the dynamics, mechanics and components (Figure 1). [13] The presented elements are not the only elements in gamification, but are some of the most frequently used. Also, not all of those elements need to be included in every gamification example because the best example is not necessarily the one containing the biggest number of elements, but the one which most efficiently applies one or more elements.



Slika 1 Piramida elemenata gamifikacije koja se sastoji od elemenata dinamike, mehanike i komponenti prema [13].

Figure 1 Gamification elements pyramid consisting of Dynamics, Mechanics and Components elements according to [13].

The dynamics is the highest-level element and describes the “bigger picture” or the game “grammar”. This includes the conceptual elements such as limitations, emotions, narration, progress and relations. Limitations contribute to the game dynamics by limiting the user’s choice and forcing the user to follow certain rules of the game. Emotions can enrich the user experience and so can entice the user to be more active in the game. The narrative can represent the story or the game flow, while the progression represents the user’s progress through the game (e.g., system of levels). The relations are also a very important dynamic element since they impact social views of the user experience (playing with friends, groups, game clans, etc.). The mechanics or “verbs” of the game speak about the processes and actions in the game. It includes elements such as challenge, opportunity, competition, co-operation, feedback, etc. (Figure 1). Challenges are used as the game goals that the player needs to score. The element of chance is included if there are actions that depend on probability and luck (e.g., rolling the). Elements such as competition and co-operation are opposite because they promote working against other players or with them in order to achieve goals. The element of the pyramid components or “nouns” represents specific examples of dynamic and mechanic. They contain achievements, avatars, badges, boss fights, collections, etc. (Figure 1). The successes are specific challenge terms that award a player at the end. Their visual representations are usually badges. They can be earned after accomplishing a certain task, such as completing a level or winning in a fight against the boss, but can also be a part of another constituent element – the collection. There are many other elements contained in the components that are a part of the pyramid (Figure 1), but whether they will be used depends on the game dynamics and the mechanics. The gamification elements pyramid offers different possibilities when creating games. For a good game to be created, balance has to exist between the elements and the players’ experience, where more elements do not necessarily mean more fun or a richer user experience.

3. NOVIJI NAPREDCI U IGRIFIKACIJI

3. *RECENT ADVANCES IN GAMIFICATION*

An array of significant gamification implementations and experiments have been carried out over the past years, mostly focused on online and e-learning and/or high education courses platforms. For instance, [14] has studied the efficiency of a gamified environment in learning for a programming course. They have used the typical gamification elements such as points, leaderboards and badges (the PLB triad) and have discovered that students prefer the gamified system in comparison to his non-gamified system by improving their performance in the programming tests. In another study [15] learning games and approach to social networking are compared to gamification and social gamification. Interestingly, their results have shown that the social game has the strongest influence on the learning success of the students. Similarly, [16] has reported of a positive influence of gamification on the students’ performance and the attitude towards learning in a study with experimental design that included 97 participants. In [17] it has also been concluded that gamification can be an efficient tool for improving the students’ effort and promoting learning outside of school.

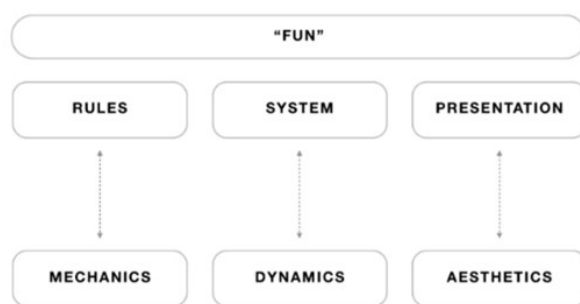
On the other hand, some researchers have reported of mixed or negative results with regard to gamification efficiency. For example, in [18] the PLB triad was implemented with a life story and concept into a studying management system where the desired outcomes level was later measured. It was concluded that, even though students appreciated some aspects of gamification, the gamification itself didn’t have significant impact on the interest, motivation or satisfaction of the students. The authors have interpreted this result taking into account the nature of voluntary playing, since playing is a voluntary activity, while the course the gamification elements were implemented into was mandatory. So, by definition, there was no voluntary consent to solving presented problems. Similarly, [19] found that motivation

and satisfaction of students taking a gamified university course have decreased over time compared to non-gamified courses. They have interpreted this as the result of a lack of personalisation which reduces the intrinsic motivation among some of the already motivated students. They have also concluded that future researches should test and compare different gamification elements and approaches, rather than simply measuring the total gamification efficiency.

3.1. OKVIR MDA

3.1. MDA FRAMEWORK

Some of the gamification elements (Figure 1) have even sooner been recognised by game designers Robin Hunicke, Marc LeBlanc and Robert Zubek who in 2004 revealed the MDA (Mechanics, Dynamics and Aesthetics) framework. [20] MDA is a formal approach to game understanding. It supports the formal, iterative approach to design and adaptation. It enables us to explicitly think of certain design goals, to anticipate how changes will impact every standpoint of the framework and the resulting designs/implementations. By moving between the three levels of abstraction, the MDA (Figure 2), we can conceptualise the dynamic behaviour of the game system.



Slika 2 Formalni pristup razumijevanju igara prema okvirnom modelu MDA (Mechanics, Dynamics, and Aesthetics). [20]

Figure 2 Formal approach to understanding games according to MDA (Mechanics, Dynamics, and Aesthetics) framework model. [20]

Each game gets analysed by decomposing to these three elements in order to observe how they influence one another and the total user experience. The mechanics is used to define the

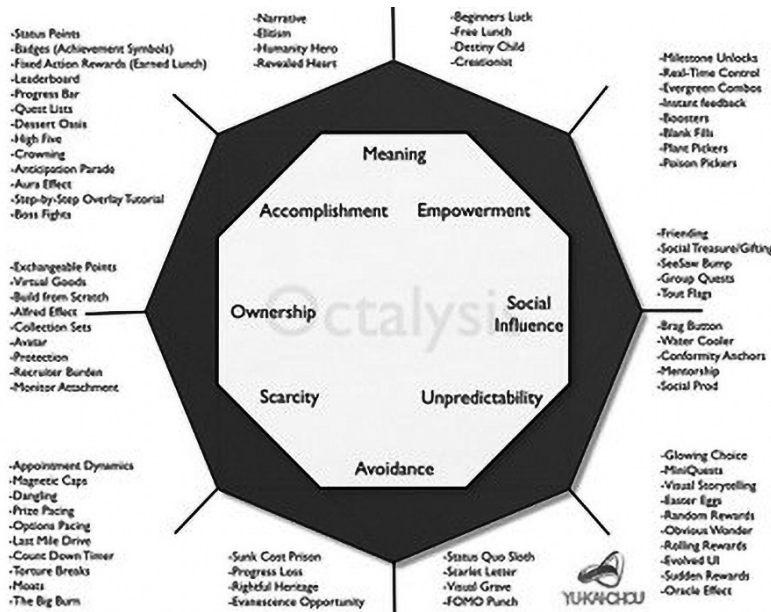
game rules at the level of algorithms and data presentation. It is usually implemented into the very game engine. The dynamics describes the mechanics behaviour during the execution (which happens during players' introduction, how mechanics influence one another, etc.), while aesthetics describes the emotional reactions of the players in order to ascertain if the game is fun and what exactly makes it fun. Apart from that, the authors in [20] list eight types of aesthetics: sensation, fantasy, narration, challenge, collectiveness, discovery, expression and tolerance. Even today, this publication and its framework are very influential in the field of gamification. The MDA is used to analyse a large number of games in order to determine what makes them similar or different and how they influence the players.

3.2. OKVIR OCTALYSIS

3.2. OCTALYSIS GAMIFICATION FRAMEWORK

Yu-Kai Chou has revealed the Octalysis gamification framework by using an octagonal shape with eight core drives that represent each side. [21] He described eight core drives for human motivation and what distinguishes one type of motivation from another.

The Octalysis gamification framework recognises that gamification in its core is design which puts the biggest emphasis on human motivation in the process (i.e., human-focused design). The framework focuses on the analysis and strategy building around different systems which make games more attractive and pleasurable. [21] In this sense, a game is considered "fun" if it attracts certain core drives which motivate each individual to perform certain activities. Different game technique types motivate players in different ways: some in inspiring and empowering ways, other in manipulative and compulsive ways. Specific characteristics which make one type of motivation different from another have also been recognised within this gamification framework. Chou describes each core drives separately (Figure 3), by decomposing it into elements.



Slika 3 Igrifikacijski okvir Octalysis. Svaka strana oblika osmerokuta predstavlja jedan od osam temeljnih poticaja za ljudsku motivaciju i opisuje kvalitete koje razlikuju jednu vrstu motivacije od druge. [21]

Figure 3 Octalysis gamification framework. Each side of the octagon shape represents one of the eight core drives for human motivation and describes qualities that differentiate one type of motivation from another. [21]

For instance, the core drive Meaning, also known as „the epic meaning and calling“ refers to the players who believe that they do something bigger than themselves. This can include moderating the community forum or creating additional content free of charge for the players community. However, even with the best intent, there is no guaranty that the contribution is always appropriate and of high quality (e.g., many additional contents of free games that were created by the community were not successful or greatly accepted by the rest of the community). The core drive Accomplishment or “development and accomplishment” is the part that describes what it is that motivates a player to progress. Why does a player learn new or improves the existing skills in a game? Which challenges do they strive to overcome? The core drive Empowerment explains what makes a player creative. If games allow creativity (such as painting, riddle solving, etc.), the game creators don’t need to add a lot of new content in order to maintain activity and motivation of the players. The core drive Ownership speaks about players feeling that they possess something valuable and advance in owning even more valuable items during the course of the game. According to [21] this is what makes some collecting type games (collecting stamps, badges, etc.) interesting. The core drive Social Influence is also an important concept in a game. They help develop socialising, mentoring, and even competition among players.

If a friend achieves a high grade or collects a set of badges, this will usually motivate other friends to try and catch up (or even surpass) the success of that player. The core drive Scarcity refers to the attempt of owning something which is not immediately available (e.g., “come back in 20 minutes until I prepare the prize (e.g., a drink)!”). This usually makes a player constantly think about the prize and excited in the anticipation of the deserved prize. The core drive Unpredictability describes the anticipation. Playing a game is sometimes very attractive simply to see what follows, be it a twist in the story or a new design of a game level. Finally, the core drive Avoidance describes the undesired situations. Players usually try to avoid losing the prize (e.g., “you have 30 seconds to achieve the goal and collect the prize”). Chou’s framework can be used for both game products and non-game products. It has been used for the analysis of Facebook and to motivate its users. A similar analysis has been carried out for Twitter and some other online products in [22].

4. NOVE PRIMJENE IGRIFIKACIJSKIH OKVIRA

4. NOVEL APPLICATIONS OF GAMIFICATION FRAMEWORKS

In this chapter, we will present some of the recent and new gamification applications. One of the

biggest advantages of gamification is that it also reduces the need for textbooks and thus helps in improving the learning process. The Gates Foundation has established the Quest school focused on games-based learning; SAP has used games in the employees training, while the US military used games in training. [23] The Khan Academy also uses gamification elements in online education. Figure 4 features one of the practical examples.



Slika 4 *Primjer korisničkog sučelja igre Ribbon Hero 2, koje se koristi u Microsoft Office paketu za produktivnost kao alat za gamifikaciju za poboljšanje produktivnosti korisnika.*

Figure 4 *An example of Ribbon Hero 2 game user interface, used in Microsoft Office productivity suite as a gamification tool for improving users' productivity.*

Microsoft has developed a game (appendix) Ribbon Hero 2 for its Office productivity suite. The user would get points for solving problems such as data sorting in adapted columns, creating diagrams, etc. In this case, gamification was used in order to help users to learn using the software, which helped them improve productivity. Gamification in education is also an interesting topic for researchers. Data gamification is used in many universities, so the authors in [3] have tried to build and develop the appropriate methodology named PM (Process Management) challenge in order to avoid difficulties and to help students, incite them to give their best in each presented problem and to improve their personal values such as accuracy, respect and co-operation. Gamification has also been successfully used in health care. [24], [25] There are a lot of application that entice people to train harder and stronger, by measuring their progress and performance, and comparing them to others in the community. Challenges have also often been used that encourage people to higher competition and motivation

(“let’s see who can lose the most weight in the next 30 days”). Numerous papers have been published that promote different motivation ideas that improve people’s health, and here we single out [26], [27] and [28]. In [26], the author has developed a mobile application that provides different motivational factors to incite and empower people to participate in health promoting activities. In order to achieve this goal, gamification is being used in combination with social media. Also, one of the most important areas where gamification can be applied is entrepreneurship. The motivated staff always brings higher involvement and productivity, but in order to achieve it, it is important for the employees to enjoy in executing their tasks.

In the review paper [27] the authors identify that gamification is important in motivation and that it increases the involvement of the employees in their business assignments. Those business assignments are:

- Valuable and accurate feedback.
- Efficient collaboration.
- Effective testing and forecasting.
- Increased productivity.
- Better planning.

In their study, the authors emphasise that business games have an exceptional capability to hold the attention of the employees, build loyalty and increase motivation. The game context acceptance in business application is encouraging because it motivates the employees to execute their tasks in a comfortable manner. According to [27], the employees in businesses can be motivated in many ways, which is usually accomplished by using the gamification techniques such as competition, scoring points for executed tasks, progress ladders, badges and achievements (e.g., “the employee of the week”), etc.

Even though gamification was initially used in software, it has soon become popular in many other areas. One such example of application of gamification is shown in the smartphone application developed to improve the characteristics of a smart city. [28]

5. ZAKLJUČAK

5. CONCLUSION

Gamification introduces many motivational and psychological elements which can be found in games and which positively impact human experience and productivity in different areas of life and work. This study presented an insight into different contemporary approaches, gamification framework and its application in different areas, with an accent on different gamification frameworks and elements, as well as their combinations. Moreover, this paper offers important empirical evidence of the efficiency of gamification and questions the prevailing positive assumption on its elements. This evidence arose from a profound analysis of the existing papers in this research field. The basis for our conclusion is a careful studying and interpretation of earlier researches that have encompassed similar point of views and phenomena. Another practical contribution is the possibility of using the presented results as a means to improve everyday teaching activities.

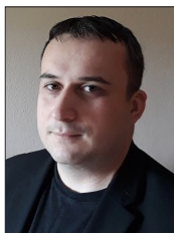
The potential for future gamification researches lies in the development of the appropriate mechanisms to adapt games to different students' preferences. This will lead to the development of a more comprehensive, adaptable teaching system with the students' profiles that include the dynamics of personalised (i.e., individually adaptable) characteristics. Another interesting area for future studies would be a research of the implications of distinguishing challenges and skill levels based on the flow theory, in order to find the optimal experience or a way for students to achieve the flow state in game activities with young students. In our future work we plan to further investigate the application of gamification in the information science, in order to meet the needs of the users in the field.

6. REFERENCE

6. REFERENCES

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