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THEORETICAL ASPECTS OF GAMIFICATION

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ABSTRACT: Gamification is a new trend which integrates activities related to the introduction of game mechanics in non-game applications to increase engagement, motivation and participation of users.The purpose of this article is to present various aspects of gamification. A discussion about the definition of gamification is given. Emergence and progression aspects of games are described. Main psychology aspects of games are presented too.

KEY WORDS: gamification, gamification definition, gamification aspects, game mechanics, engagement

Introduction

Gamification is a new trend which integrates activities related to the introduction of game mechanics in non-game applications to increase engagement, motivation and participation of users. This approach is particularly promising in the field of business, as corporate information systems focus mainly on aspects of performance and not on individual long-term motivation.

The aim of the article is to present definitions and theoretical aspects of gamification and also introduce motivation and psychological concepts.

1. *Definition of gamification*

In the research literature there are two competing definitions of gamification. Some authors [1, 2] define gamification as

"the use of game design elements in non-game contexts".

Their work is based on prior established theories. For example, the definition is based on Caillois [3], who distinguishes between ***paidia*** and ***ludus*** as two different types of activities. While paidia (playing) refers to improvisational and expressive behaviors in free form, ludus (gaming) characterizes the play, based on rules and determined goals in accordance with Caillois' definition of a game:

"an activity that is voluntary and enjoyable, separate from the real world, uncertain, unproductive in that the activity does not produce any goods of external value, and governed by rules."

This distinction is consistent with the classical game research where ludus is characterized by clearly defined rule systems and discrete goals and outcomes [4, 5]. Moreover, McGonigal defines four basic characteristics that can be found in any game: ***clear goals***, which give the player a sense of purpose, ***rules*** that define the limitations how to

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achieve the goal, a ***feedback system*** giving the players hope that the goal is definitely achievable and a ***voluntary*** participation, i.e. the user accepts the goals, rules and feedback of the system voluntarily. Everything else, such as interactivity, narrative context, graphics or rewards are enhancements or reinforcements of these defining features [6].

CONSEQUENTLY, the author has introduced the term ***gamefulness*** in contrast to ***playfulness*** for gamification. Past Studies human - computer interaction research has primarily focused on the playfulness of software systems [1, 7]. Little attention is given to studies related to gamefulness, although the idea of game elements isolation and their adoption is not entirely new (e.g., [8, 9, 10]).

IT is important to mention that the separation into paidia and ludus is a theoretical question. In practice, however, games and gamified systems may also coincidence with playful behaviors and attitudes (e.g., [11, 12]) and vice versa (e.g., [5]).

BESIDES this distinction, the definition means that gamification is not about constructing games as a ***whole***, but merely for the implementation of some of their parts (game design elements) that may support motivation and participation in non-game contexts.

DESPITE their accurate definition, [1] do not report a complete list of game design elements, specific to gamification. Instead, they provide a general classification for structuring these elements on different levels. In this classification, exemplary design elements, tools and methods of games are divided into five levels of abstraction, including ***game interface design patterns***, ***game design patterns and mechanics***, ***principles and heuristics***, ***models*** and ***methods*** of game design (Table 1).

THIS hierarchy defines very general and abstract methods on the highest level L5 and very specific elements on the lowest level L1, where those on the lower level are created using methods and tools of the higher levels.

Table 1. *Levels of game design elements [1, p.12]*

LEVEL	DESCRIPTION	EXAMPLES
Game Interface Design Patterns (L1)	Common successful interaction design components and design solutions for a known problem in a context, including prototypical implementations	Badges, Leaderboards, Levels (e.g., [13, 14])
Game design patterns and mechanics (L2)	Commonly reoccurring parts of the design of a game that concern gameplay	Time Constraints, Limited Resources, Turns (e.g., [15, 16])
Game design principles and heuristics (L3)	Evaluate guidelines to approach a design problem or analyze a given design solution	Enduring play, clear goals, variety of game styles (e.g., [17])
Game models (L4)	Conceptual models of the components of games or game experience	Mechanic-Dynamic-Aesthetics (MDA) [18], Fantasy-Challenge-Curiosity (FCC) [19], Game design atoms [20], Core Elements of Gaming Experience (CEGE) [21]
Game design methods (L5)	Game design-specific practices and processes	Playtesting, Playcentric design, Value conscious game design (e.g., [22, 5])

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PART of this hierarchy is consistent with classical game research. For example, some authors [23] consider ***semiotic layer***, i.e. the part of the game that informs the player about the game world and the game state through visual, auditory and textual and sometimes haptic feedback. This refers to the level L1 of Table 1. The same scientists identify a ***mechanical layer*** which is the engine that drives the game action and changes the game state. It refers to L2 of the presented hierarchy.

THE game mechanics layer (L2) can be defined in more detail. According to Mahlmann [24], game mechanics refer to the gameplay which emerges from rules (of the game) and therefore may consist of one to many different rules. They can form a rule set procedure that determines the overall algorithm of the game [25] or can be considered as the procedures of actions [26], i.e. the procedures that are triggered based on the users' input to the game.

OTHER authors [27] criticize the definition of Deterding, Dixon, Khaled and Nacke [1], since it suggests that every system is defined as gamification if it has at least one game design element. For this reason, they propose to include the overall goal of gamification into the definition, namely the support of the user's overall value creation:

Gamification refers to a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation [27].

HUOTARI and Hamari consider gamification as a continuous process of enhancing a service or system with the relevant game design elements.

IN this article, both definitions are considered as valid. First, the isolation and application of game design elements in non-gaming context is considered as gamification. The current research literature does not provide a set or classification of such game design elements. In addition, there is no clearly defined particular subset of elements for the domain of gamification in a central place.

SECOND, this article considers gamification as a continuous process of enhancing and improving the business processes and information systems of the companies in terms of participation, motivation and engagement. The analysis of this comprehensive process is useful in relation to the identification and understanding of the practical problems associated with gamification.

2. *Emergence and progression aspects of games*

ANOTHER important aspect of games is the consideration of ***emergence*** and ***progression***, which have to be reflected for gamification as well.

ON the one hand, emergence is defined as the combination of rules, which may lead to variation in games and is the ***primordial*** game structure according to some researchers [4]. In other words, games need rules that lead to many different combinations and states as in classical board or card games (such as chess). These potentially large numbers of combinations can lead to the design and derivation of strategies. Therefore, the replayability of emergent games is high. Moreover, such games are characterized through an end state (e.g., a winning state), i.e. the game is finite.

ON the other hand, progression is characterized by a set of rules that lead to a relatively low number of states and which enforce the players to go through a predefined sequence of actions along a predefined path. According to Juul, game mechanisms for progression have become popular with the rise of video games. For example, typical progression game genres

such as jump-and-run or role playing games can be found almost in the form of video games only. The replayability of such games is low and an end state is not necessarily required. In addition, extending the game with new elements (e.g., missions, goals or levels) is easier compared to emergent games [4].

IN the context of this article it has to be noted that gamification is primarily concerned with the design of progression games. It is argued that the non-game context in which the game design elements are applied is already an emergent system (e.g., the workplace). The designer of gamification does not need to design primarily for emergence. This does not mean that the design of gamification may not be designed for or lead to emergent effects. However, this is not the main goal of the design. For this reason, it should be pointed out that mainly game mechanics for progression can be found in the existing literature for gamification.

3. *Psychology of games*

NEUROSCIENCE researchers have found that playing video games releases high amounts of dopamine in the human brain [28]. Dopamine is associated with better learning, reinforcement of the current behavior and attention. Other scientists [29] discovered that dopamine influences the ***incentive salience*** in general reward situations, i.e. the recipients ***want*** the experience more often. However, there is no mediation with ***hedonic impact***, i.e., the recipients do not necessarily ***like*** the actual experience more.

DOPAMINE is released in reward situations. These awards may have extrinsic or intrinsic nature. Representatives of the first type are such as money, status, goods, promotions or punishment, while the second group includes , for instance, positive emotions, individual strengths or social connections. While ***extrinsic*** motivators lead to ***hedonic*** behavior, ***intrinsic*** rewards lead to ***autotelic*** behavior under which all self-motivating and self-rewarding activities are included [30]. McGonigal [6] argues that these autotelic activities engage people completely and are the most enjoyable, satisfying and meaningful emotional states that they can experience.

IN fact, video games and their designers rely primarily on intrinsically motivating factors since extrinsic ones are virtually not available. According to a survey, 58% of the US population spent $14.8 billion on video games in 2013 [31]. From this percentage, more than five million people in the United States play games for 40 hours per week. Researchers [32] found that 46.6% of employees play games during their working hours. As another example, gamers have totally spent 5.93 million years of playing World Of Warcraft [6].

THE advantage of the intrinsically motivating factors is that they are, on the one hand, inherently associated with the perceived experience and, on the other hand, are created from oneself. They scale better than extrinsic rewards, which are limited in terms of frequency and size.

IN the field of psychology, positive psychology researchers study structures that lead to happiness. The adoption of concepts from positive psychology in the field of organizational psychology led to the proposal of happiness conceptualizations (e.g., engagement) in workplace environments.

ESTABLISHED theories and models are, for example, the self-determination theory [33], the job demand-resource model [34, 35], psychological capital [36], positive organizational behavior [37] or flow [38, 39]. The job demand-resource model describes intrinsic factors leading to engagement on the job. These factors are divided into ***personal resources*** (hope,

mastery or self-efficacy) and ***job resources*** (social support, different skills, environmental climate).

ANOTHER study compares the factors leading to engagement on the job with factors leading to engagement in games [40]. It was found that the majority of the factors are supported equally in both domains.

THIS comparison supports the hypothesis of gamification in the enterprise, i.e. that it is possible to achieve higher levels of engagement and motivation through the isolation and application of game mechanics in this specific domain. Based on these factors, various scientific studies proved the quantitative or qualitative benefits of gamification (e.g., [40, 41]).

CONCLUSION

THE article considers various aspects of gamification. It has been shown how gamification differs from classical and video games. Moreover, models, theories and hypotheses related to gamification have been outlined.

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