Gamification Framework: The Contribution of User Centered Design, Social Media Applications, Gaming and Psychology Concepts and Frameworks

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Abstract. This paper reviews the literature on gamification in different context. As a result of reviewing 200 peer-reviewed studies a 39 paper was cited to cover most frameworks and context in the field of gamification. Based on our review, we discussed the use of user-centered design, game design elements, HCI, social media application, and psychology concepts in gamification development. We provided some examples from the literature to illustrate the application of gamification in different context.

Keywords: Gamification · Game design elements · HCI · Gamified education · Social media application

1 Introduction

Gamification refers to the use of game design elements to non-game activities and has been applied to many fields and different contexts including education [1]. Many Gamification frameworks built on game design elements to increase users engagement, interactions, and the application outcomes [2]. Most of Gamification frameworks focus on motivational, psychological, and behavioral outcomes [2]. Most of these studies of gamification focused on the general concept and factors of gamification. Also, they develop Gamification frameworks based on selected game design elements such as points, badges, leaderboards, and storyline and selected game design elements frameworks [3, 4].

Searching for peer reviewed articles in the field of gamification, edutainment, and game design elements to investigate gamification related frameworks in different libraries including ScienceDirect, EBSCOHost, ACM Digital library, Web of Science, Proquest, and Scopus would show results of more than 10000 studies. Using Google scholar would be more effective in the case of using keywords such as gamification and edutainment frameworks to investigate the most relevant top cited papers. Since the recent studies would have lower number of citation in Google scholar, we reviewed the most relevant 100 papers to gamification frameworks in the last three years.

Looking at the potential of gamification in many fields we are interested to review frameworks and game design elements that have been used as a base for Gamification

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frameworks. Hence, in this paper, we review the literature on gamification and report our synthesis of the findings from the literature.

2 Method

The literature review conducted by searching multiple libraries including ScienceDirect, EBSCOHost, ACM Digital library, Web of Science, Proquest, and Scopus. The search included topics such as gaming Skills, game Simplifying process, increase effectiveness and motivation through computer games, engagement in video games, educational games, edutainment, e-learning and video games, social effect of video games, gaming and play in educational setup, games/simulations and classroom instruction, game elements and educational needs, learn from games to support educational environments, gamification, serious game, using video games to change behavior and learning future, potentials of gaming design elements in education, game effect on student skills and motivation, game strategies to engage learners, use games as educational tools, educational games vs. simulation, educational VR games effect and acceptance, video games and learning outcomes, serious games opportunity and design factors, healthcare and video games, online games, and virtual reality and interactive learning environments. This process produced more than 10000 papers. Thus, we used Google scholar and selected the most relevant papers to gamification and edutainment. The top 100 cited papers using keywords such as gamification and edutainment frameworks and the most relevant 100 papers to gamification frameworks in the last three years were reviewed. All books or book chapters, and duplicates with other articles were excluded. Papers with more than 60 citations and from 1980 to 2018 were reviewed.

3 Review of Literature

We carried out a review of the literature on gamification studies and game design elements frameworks. Many game design elements, user centered design, and HCI concepts for gamification are discussed in these papers along with their impact on the field.

3.1 Gamification Studies

Gamification has been a hot topic of investigation since 2010. Most researchers define gamification as merging game design elements in non-gaming contexts [1]. Enjoyable systems and interfaces have been studied intensively since the early 1980s. Several studies discussed challenge, fantasy, and curiosity as video game design elements to influence user enjoyment and UX on other systems [5]. For example, Malone [5] analyzed that challenges, clear goals, feedback, fantasy, emotions, and curiosity are the key elements to designing enjoyable systems. Thus, a gamified layer on non-gaming systems adopts elements involving enjoyable factors, while providing options for decision making, creating additional feelings that transfer from the digital to the real

world, uncertain connections to external values, and work by rules [6]. Some of these gaming elements - such as clearly defined goals, better scorekeeping and scorecards, more frequent feedback, a higher degree of personal choice of methods, and consistent coaching - came from understanding the role of enjoyment in improving performance throughout many gaming and non-gaming environments [7].

Changing of information and work environments, knowing how to play online games, the high-use of social networks, and an increase in customer-driven business, lead to the development of more effective gamification environments. In the field of education, Mitchell, Danino [8] have recently analyzed the importance of student involvement in the development of an effective learning experience by motivating them through self-learning tools. They reviewed an additional study conducted in 2007 by Presky, in which the author examined why humans engage in games. They report: "He suggests that the key structures of games can be classified into six key categories: rules, goals and objectives, outcomes and feedback, competition, interaction, and representation." In addition, they evaluated an additional study conducted in 2010 by Corcoran, in which the game provided "instantaneous feedback, egging on the competition, and rewarding even tiny steps of progress". Gamification assumes that the player isn't especially motivated and then provides barrels of incentives to ramp up that motivation." Mitchell, Danino [8] also argued that connecting the gamification process to the user's real world would motivate the user even further. For instance, "one student commented that seeing his team move up and down the leader-board was like seeing his grade go up and down each day, and this made him increase the effort he put in."

Similarly in the field of advertising, Terlutter and Capella [9] discussed that there are out-of-system factors that could affect the gamification application. First, individual factors include: level of maturity, cognitive capabilities and capacities, advertising literacy, media literacy, recognition of commercial intent, game familiarity, gaming experience, brand familiarity, attitudes toward advertising, involvement with game, involvement with brand, flow and its antecedents, and entertainment. Second, social factors include whether the game is single- player versus multiplayer, whether there is any social interaction during game play, peer communication, peer group influence, family influence, opinion leadership, and culture.

In addition, most gamification developers focus on customers and ignore employees. This is in spite of the fact that employee satisfaction builds customer satisfaction, and employee dissatisfaction could destroy the organization and customer loyalty [10]. Moise [10] reported that one can have pleased customers for a short period of time; however, an inattentive organization will have to face economic downturns, and even their customers will no longer be loyal if the organization does not also take care of their employees in the long term.

Aparicio, Vela [11] identified several tasks involved in creating an effective gamification environment. First, producers must identify the main goal of the function they want to gamify. Second, they must identify objectives that are interesting to people. Third, they must select game mechanics that match the objectives and support the needs of human motivation. Finally, they should test the effectiveness of the gamification application based on fun, quality indicators and satisfaction, and service quality. Another use of gamification lies in combining games with social media networks, which leads to changes in the lifestyles of consumers. Berkovsky, Freyne [12]

stated that gamification's enjoyable properties of playing elements can change the nature of the activity, and induce participants to participate in bursts of physical activity.

In other words, gamified systems borrow elements from video games, SMA design elements, and HCI theories and concepts to make other "non-game" services and products more enjoyable and engaging [1]. Some studies identified gamified systems according to gaming and playing concepts [1]. According to these studies, any system can be gamified if one gaming element is used in part of that system. Also, gamification application uses game design elements rather than being a fully-developed game, video game, or serious game [1, 13]. Gamification "has the game structure, but not the game surface" [14].

While the objectives of both gamification and serious games applications are not entertaining, serious games are more related to simulated game solutions. These developed for the purposes of training, investigating, and advertising [1, 13]. Serious games feature a full-fledged game design [1]. On the other hand, gamification is more suitable under partial game designs [1]. However, some research suggested that gamified systems should be defined as the continuous process of improving users' system interaction, with opportunities for gameful experiences to fulfill stakeholder needs and values using game design elements [15]. Therefore, connecting user-centered design concept of game design elements to gamification would make it more effective [16]. Nicholson [16] in fact suggested that a meaningful gamification system would include user-centered game design elements into non-game contexts.

Furthermore, gamification structure, as previously mentioned, influences the system output by changing user behavior. But, how do gaming elements work to motivate people? Flatla, Gutwin [17] discussed this particular question, and argue that collaboration is an essential part of interactive systems to ensure that input and output are ideally configured. Thus, gamification structure would motivate users to participate, thereby improving the performance and accuracy of human-computer interactions [17]. Also, Mekler, Brühlmann [18] added that meaningful frame elements motivate participants to generate more interactions and inspired them to do better at tasks within the game, thereby creating a high quality experience.

Gamified applications take the advantage of using powerful game design elements, and apply this advantage to solving problems in different fields [19]. The use of gamification concepts has the ability to affect engagement and loyalty, improve motivation, change behavior, encourage contribution, increase involvement, and contribute to efficiency [19, 20]. For example, a company could use gamification for brand awareness, improving marketing strategies and effectiveness, and increasing user retention and participation [1, 13]. For instance, in personal and business use, gamification could affect work completion time positively and improve the quality and the quantity of work [20]. In addition, it would reduce errors and mistakes with faster feedback, in order to improve visibility of progress and recovery from errors [20].

Gamification adopted concepts from the video game industry, psychology, computer science and marketing to deliver more effective results [21, 22]. In gamification, psychology and HCI studies and concepts play the role of understanding human behavior and needs [23]. Thus, it drives user behavior toward specific targeted values [13]. Furthermore, motivating contribution on a system using gamification can affect

user behavior [21]. Moreover, social psychology theories contribute to our understanding of gamification, particularly with regards to understanding the motive behind human social interactions and participation in gamified systems [20, 21].

3.2 Gamification Theories and Frameworks

Many developed gamification systems' design based on theories and frameworks from HCI, gaming, and psychology fields. For example, a "User-Centered Theoretical Framework for Meaningful Gamification" has been used to define users as the center of designing meaningful gamified system [16]. Also, many studies considered gamification investigations under persuasive technology field [24]. Fogg [25] provided eight steps in the process of designing persuasive technology (Fig. 1). These steps are used as milestone for effective design in gamification.

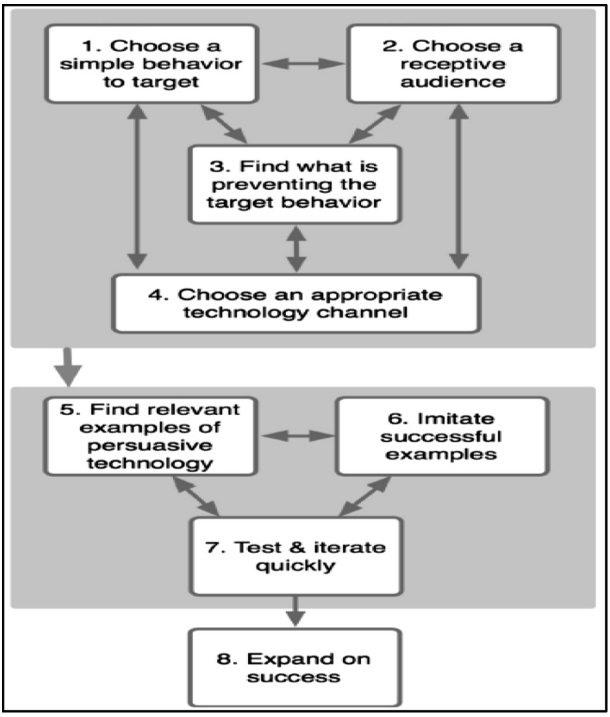

Fig. 1. Fogg's eight step model of persuade technology [25].

Since gamified system in utility applications required users integration, understanding people behavior is an essential factor in designing an effective gamification system. "Self-determination Theory" (SDT) [26, 27] helped understanding users behavior. SDT predict goal-oriented behavior through user needs and motivation [28]. Three fundamental needs (Competence – Relatedness – Autonomy) were defined to enhance personal growth [26]. Two motivation categories (intrinsic and extrinsic) were

defined from SDT needs [26, 28]. Four types of intrinsic rewards (Satisfying work - Experience of being successful - Social connection – Meaning) were developed using SDT theory [29].

Gamification applications use combination of both extrinsic and intrinsic motivations to engage the users [30, 31]. As well as "Four –Drive" model helps to understand the reasons of users acting in a certain way [32]. The model categorizes motives to change user behavior to four categories[32]. Thus it would satisfy our biological need for curiosity. These categories include [32]:

- Acquire: The felling of obtaining physical and emotional things.
- Bond: The relationships and communication between individual.
- Defend: Protection from physical and emotional threats.
- Learn: Gaining new knowledge and skills.

In addition, "Fogg's Behaviour" model proposed three elements to change use behavior (Motivation – Ability – Trigger) [13, 22, 33].

- Motivation: The desire level of engagement in an activity.
- Ability: The level of skills to performer a task.
- Trigger: The level of encouragement to do a task.

Furthermore, "Persuasion Profiling" model provide several principles to enhance users' behavior towered specific manner [22]. These principle include:

- Reciprocation: The obligated feeling to return a favor.
- Scarcity: People value rare things more.
- Authority: The power of legitimate authority request (people will follow/believe the request).
- Commitment and Consistency: People do as they said they would.
- Consensus: People do as other people do.
- Liking: We say yes to people we like

From game design field, the "Four Elements that Defined a Game" theory [34] has been used on gamification. This theory provides four elements to define games, which it could be useful for designing gamified systems [34]. These elements include goal and outcome, rules, feedback, and voluntarily participation [34]. McGonigal's Four Game Experiences model [34] supports using game design elements to develop an effective gamification system. This model suggests four types of experiences in gamification influenced by game design elements [34].

- "Urgent optimism": enjoying overcoming obstacles to engage with the system and others by searching for the solutions.
- "Blissful Productivity": the motivation of continues efforts to face challenges.
- "Social Fabric": The feel of belonging.
- "Sense of Epic Meaning": enjoying selfless objective achievements.

In addition, using "Dignan's Behavioral game" model in designing gamified systems would enhance any activities and tasks to be more engaging and learnable by employing game elements to user interactions in everyday experiences [35, 36] (Fig. 2).

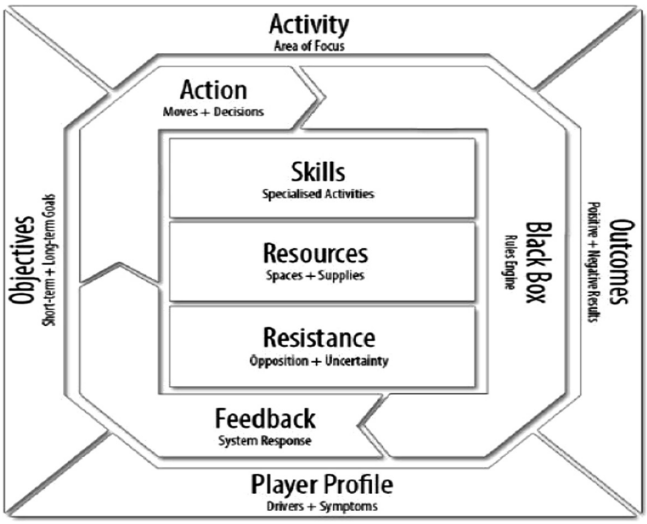

Fig. 2. Dignan's Behavioral game model [35].

Moreover, Flow Theory [37] is widely used in gamification. Flow is defined as the state where users are deeply involved in an activity, forget about the time and nothing around matter [37]. This concept would affect changing behavior; witch is one of the objectives of gamifying applications and activities [22]. In term of players personality "Bartle's Four Player Personality Types" model would help to develop an effective gamified strategy by understanding the users behavior and play experience patterns [38]. It suggests four types of players [38].

- Explorers: This type drives by the enjoyment of finding, understanding and exploring everything.
- Killers: This type drives by the enjoyment from causing anxiety.
- Socialisers: This type drives by the communication and relationship between players.
- Achievers: This type drives by the enjoyment of getting to the goal/objective.

Finally, "Five Stages Behavior Change Lifecycle" model provides insight into the type of games that will modify users' behaviors [24]. First stage focuses on the improvements of the users' behavior. In this stage behavior-instrumentation games are used to measure real-world behavior and investigate best practices [24]. It helps to view users' behavior and connect that to the real-world behavior. Thus, it would enhance the recognition of improvement opportunities [24]. The main challenge of this stage is when we don't know if the users are doing something wrong in the real-world behavior [24]. Second stage is the committing to the change effort. In this stage cause and effect-simulation games are used to illustrate the benefits and build a structure to measure sub-goals [24]. The main challenge in this stage is the ignorance or not fully understands the value and the cost of the change [24]. Third stage is to understand the principles and the major mechanisms of the target behaviors. In this stage dynamic-system games

provide a way to understand the target behaviors and patters that develop specific processes and mechanisms. The main challenge is not having enough background knowledge to understand the target behavior and the principles involved in the target behavior [24]. Fourth is adopting a new behavior. In this stage skill-building games helps users to practice and exercise specific behavior in controlled environment [24]. The main challenge is the lack of experience to of specific mechanisms and not having the comfort level to perform specific patterns of target behavior [24]. Final stage is mastering and maintaining the new behavior. In this stage behavior-instrumentation games are used to measure real-world behavior. It does help to maintain real-world behavior and refine the target behavior over time through controlled environment [24]. The main challenge of this stage is the continues need for practice and reinforcement of the target behavior [24].

4 Conclusions

In short, the research in this field show that systems having some game design elements and gameful experience can produce some quality results in contexts other than games. In addition to using game design elements and providing gameful experience, most of the gamified systems are using social media application elements to enhance specific users' behavior toward the system values. Therefore, the combination of psychology, video games, business, computer science, and HCI theories and concepts comprise the power of gamification to deliver more effective results. Gamification uses these powerful elements and applies it to solve different issues relate to different fields (help organizations teach, persuade, motivate, and develop meaningful brand relationships, and enhance the user experience) [22, 39].

However, most of these studies of gamification focused on the general concept and factors of gamification. In addition, they propose high cost implementation to different existing system such as enterprise systems.

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