

Effective Gamification Design: A Literature Review

Yongwen Xu*

*Department of Information and Computer Sciences, University of Hawaii at Manoa, Honolulu, Hawaii, USA.
E-Mail: yxu{at}Hawaii{dot}edu

Abstract—As “Gamification” quickly becomes a hot topic across industries and academia, it deserves more thorough study through qualitative and quantitative research. There was a definite feeling of infancy of gamification, be it the definition of gamification or the effectiveness of gamification. This document provides a survey of this recent phenomenon of “gamification”: a concept that has been applauded as a “game changing layer” and derided as a “useless buzzword”. It provides a comparative review of different schools of thoughts on the effectiveness of applying game mechanics to non-game contexts. Both industry implementations and academic research is reviewed and analyzed. Most of gamification thought leaders agree that the current state of gamification is mainly focus on extrinsic rewards. While some see the bigger potentials of sustainable gamification with deeper researches in the intrinsic rewards from good game designs.

Keywords—Effectiveness; Game Design; Gamification; Motivation; Serious Game.

Abbreviations—Design Innovate Communicate Entertain (DICE); Fogg Behavior Model (FBM); Massively Multiplayer Online Role Playing Game (MMORPG); Multi-User Dungeon (MUD); Technology Entertainment Design (TED); World of Warcraft (WoW).

I. INTRODUCTION

WIKIPEDIA defines gamification as “the use of game play mechanics for non-game applications, particularly consumer-oriented web and mobile sites, in order to encourage people to adopt the applications” [Wikipedia, 2]. The term gamification only came into widespread use in February 2010, as part of the DICE 2010 conference. Jesse Schell, a game designer and professor from Carnegie Mellon, gave a presentation entitled “the future of games” in which he claimed that elements of games will invade every part of our daily lives [Schell, 3]. The term gained more prominence through several recent books such as Gabe Zichermann’s “Game Based Marketing” [Zichermann & Linder, 4], who advocated the use of game mechanics in marketing, and Jane McGonigal’s “Reality is Broken” [McGonigal, 5], who claimed that games will make us better human and game is a solution to the broken reality. Finally, Baron Reeves’s “Total Engagement” [Reeves & Read, 6], who claims that games and virtual worlds will change the way people work and businesses compete. At SXSW 2011, entrepreneur Seth Priebatsch talks about games as the new layer that similar to the social layer, “will change the world” [Seth Priebatsch, 7].

In IT industry research, Gartner predicts that by 2015, more than half of companies managing innovation processes will employ gamification [Gartner, 8]. In that same time frame, M2 Research forecasts that game mechanics

production will generate \$1.6 billion in revenues and will account for 23% of social media marketing budgets [M2 Research, 9]. As of today, existing gamified applications already range across diverse application areas in including productivity, finance, health, sustainability, news, user-generated content and e-learning. Several vendors, mainly startups, offer gamification as a service layer of reward and reputation systems with points, badges, levels and leader boards, with a recent spate of venture capital investment in this emerging industry.

In the 2011 Gartner Hype Cycle report, gamification, along with big data and the internet of things, are new additions [Gartner, 10]. According to Gartner, gamification is on the rise to the peak of the hype, the stage of the “peak of inflated expectation”, with a subsequent 5-10 years required for mainstream adoption. Gartner uses hype cycle theory to track technology adoption: after the peak period, the technology will slip into the trough of disillusionment, after which some technologies will start climbing the slope of enlightenment and eventually reach the plateau of productivity. As with any technology, gamification will inevitably slip into the disillusionment trough where the hype is passed and the masses realize that there are a lot of unsolved problems. The question remains if gamification will eventually climb out of the trough and appear in the plateau of the cycle.

In fact, there is already quite a lot criticism of gamification in the media. Some call it a mere buzzword, a hyped-up version of a mileage loyalty program, or a superficial “pointification”, which often misses elements such as storytelling and experiences which are central to what make games effective [Margaret Robertson, 11]. More and more game designers and researchers are looking into the deeper practice of gamification. Amy Jo Kim presents “Smart Gamification” which focuses on designing an effective “Player Journey” with intrinsic rewards preferred over extrinsic rewards [Amy Jo Kim, 12]. Jane McGonigal emphasizes the aspect of “Playfulness” in gamification instead of game mechanics [Jane McGonigal, 13]. Similarly, researcher Sebastian Deterding criticizes the current practice of simplistic gamification and stresses the importance of “meaningful play” in his Google Tech Talk “Getting Gamification Right” [Sebastian Deterding, 14].

Gamification is quickly becoming an IT phenomenon, with some argue it is a meaningless buzzword, while other argue it will revolutionize information technology in the same way as social networks.

The goal of this document is to review the different gamification design thoughts and approaches as thoroughly as possible, and to examine commonly employed game mechanics with respect to their usage and effectiveness.

II. LITERATURE SURVEY

This section describes the literature survey related to gamification. It starts with the definition of gamification, followed by examples, why game and gamification. The science behind gamification and the current state of gamification design are described next. Finally gamification services and platforms are surveyed.

2.1. Defining Gamification

Although gamification is a popular buzzword, there are quite a few definitions. Bunchball, a company that provides gamification services to marketers, defines gamification as “integrating game dynamics into your site, service, community, content or campaign in order to drive participation” [Bunchball, 15]. Wikipedia defines gamification as “the use of game play thinking and mechanics to solve problems and engage audiences” [Wikipedia, 2]. They all seem to tie gamification to the goal of engagement. Some others consider any game-related application as gamification, such as serious game, playful interaction and game-based technologies. Researcher Sebastian Deterding proposes an academic definition: “Gamification is the use of game design elements in non-game contexts” [Sebastian Deterding et al., 16]. This is the definition we choose to use in our discussion.

2.2. Gamification Examples

There are many examples of applications that effectively employ game design elements. We will only briefly examine a few here for the purpose of better understanding the

gamification concept and how it is utilized across a wide range of technologies.

FourSquare [17] is a location-based game-like service where players check-in to locations for virtual points and rewards. It is probably the most recognized example of applying game mechanics to location-based networking application. By employing gamification elements such as points, badges, levels and leader boards, it engages users to revisit a location such as restaurant or pub and become a loyal customer and finally the “mayor” of the place. Some virtual rewards such as the “mayors” of Starbucks or certain badges can be converted into real products, e.g. a free coffee. Foursquare proved that simple game mechanics can affect user behavior by engaging 10 million customers with a successful business model.

Nike+ [Nikeplus, 18] is a social running game-like application that employs game mechanics to encourage runners - both casual and hardcore - to compete and improve their fitness, with the goal of solving the main problem of most fitness programs: motivation. Nike+ makes it easy for runners to upload their exercise data to its web site, and start challenging themselves and their friends. They can also get supports from their friends through the web site. The game attempts to make running and exercise fun.

RibbonHero [19] is a game that attempts to help users discover new Microsoft Office features in a fun and motivating way. The goal is to have users build familiarity and expose them to the Office UI, so that they understand what kind of features are available. According to the creator of the game, Office “has a lot of powerful features that users might not know but can be really useful”. The game gives users a chance to learn those features in a fun and engaging way, rather than reading the software manuals or watching the typically dry IT training videos.

RecycleBank [20] introduced a series of “Green Challenges” that used gaming techniques online to motivate participants to learn about green living and to take small green actions to live more sustainable lives offline. According to their report, 49,000 individuals participated in the “Green Your Home Challenges”. They found that: a) Gamification can increase awareness of positive environmental actions. 97% of participants surveyed said the game increase their knowledge of environment. b) Games can drive individuals to take positive social and environmental actions. Most participants surveyed indicated they are very or extremely likely to take green actions as a result of participating in the challenge. c) Games are an effective and appealing educational tool. 86% participants agreed online games and contest can be a good way to inform and educate them personally.

Byron Reeves et al., [21] described the design of Power House, an energy game that connects home smart meters to an online multiple player game with the goal to improve home energy behavior. In the game, the real world energy data are transformed into a “more palatable and relevant form of feedback”, and players may be incentivized by the in-game

rewards to complete more energy- friendly real-world behaviors.

2.3. Why Games and Now

Gamification is not games. In fact, the subjects of gamification deal with everything else but games. However, to understand the research in gamification, we have to look at the studies of games. Games already prove to be an effective, engaging media and are ubiquitous in everyday life. "Video games are everywhere" is the critical thesis of many gamification advocates.

Why game? Results of a study published in the May 1998 issue of Nature [Koepp, 22] demonstrated that video game players experienced regular releases of dopamine during game play. Dopamine is a neurotransmitter that signals pleasure rewards for food, sex and addictive drugs, such as cocaine. This study proves that playing games stimulates pleasure centers in the brain. People are hard-wired to enjoy games.

Carnegie Mellon University professor and game designer Jesse Schell, who ignited the first wave of interest in gamification with a keynote address at the 2010 Design Innovate Communicate Entertain (D.I.C.E.) Summit, mentioned that he was surprised so many people are now taking interest in his presentation. He had talked about the phenomenon for years with little response. Back in 2008, Gabe Zichermann coined the term "funware", which is the use of game mechanics to encourage desired user actions and generate customer loyalty [Zichermann & Linder, 4]. Although it has the similar concept as gamification, the term "funware" did not gain traction.

Why now? According to Schell, "We're moving from a time when life was all about survival to a time when it was about efficiency into a new era where design is largely about what's pleasurable". Online games have entered the mainstream and become a new culture revolution, helped by platforms such as smart phones, tablets and Facebook. Gamification is a way to arrive at a "fundamental understanding of what it is that's pleasurable to people" from many aspects of life.

In the British Museum's department of Greek and Roman antiquities, there is an exhibition section about ancient games. A favorite subject of Greek vase-painters was Ajax and Achilles playing backgammon. It is noteworthy that both Ajax and Achilles have the full armor on while playing the game. According to Arthur A. Krentz, Plato's "Republic" described the connection between play and education of both adult and children. He points out that, the term "paideia" (in Greek, means education/culture), "paidia" (means play/game/pastime/sport), and "paides" (means children), have the same root. The three terms often show up in the same context. "The central aim of pedagogy (paidagogia) is to encourage learning as a form of play (paidia), which is the most persuasive and effective approach to learning" [Krentz, 23].

In modern times, World of Warcraft (WoW) is a massively multiplayer online role-playing game (MMORPG)

with 11.1 million subscribers, currently the world's most popular MMORPG. Nick Yee [24] describes 5 motivation factors behind why people play MMORPGs: (1) Relationship; (2) Immersion; (3) Grief; (4) Achievement; (5) Leadership. Yee also noted that the shared experience, the collaborative nature of most activities makes MMORPG unique. "It's the people that are addictive, not the game". "Most importantly, it is the reward of being socialized into a community of gamers and acquiring a reputation within it". He claimed that "WoW truly is a virtual Skinner box", smoothly increasing reward and difficulty and reinforcing player commitment along the way. Ducheneaut et al., [25] described that many of WoWs subscribers play alone with a different kind of social factor, "audience", a sense of social presence. There are three appeals in being "alone together" in multiplayer games: (a) interacting with an audience: MMORPGs are in essence reputation games - an avatar wearing powerful items, for instance; (b) being surrounded by others; (c) laughing at and with others.

2.4. Why Gamification

In her popular TED talk "Gaming can make a better world" and in her book "Reality is Broken", researcher and game designer Jane McGonigal [5] illustrated why good games make us better, and how they can help us change the world. She notes that currently more than 3 billion hours a week spent playing video games by our society, for good reasons. She says that the average gamer plays 10,000 hours of games by age 21. That's about the same number of hours that students spend in high school and middle school. There are 500 million gamers today, playing on all sorts of platforms from the iPhone to the game consoles. Instead of the common conception that gaming is a waste of time, she argues that "playing games is the single most productive thing we can do with our time" and is the solution to our current "Broken Reality".

Another instrumental work comes from Byron Reeves's book "Total Engagement" [Reeves & Read, 6]. He argues that games, especially MMO type games, can change the way people work and businesses compete.

In his book "Game Based Marketing", Zichermann & Linder [4] stated that "FunWare" is about taking the lessons learned from the game industry and baking them into any kind of life experience. Marketing has always been about a certain degree of persuasion and motivation, and a degree of manipulation. Games do that most effectively. "Game mechanics and the psychological conditions are powerful tools that marketers can use, and they are a lot cheaper ... than cash in the long run". "Games are the only force in the known universe that can get people to take actions against their self-interest, in a predictable way, without using force".

2.5. Science behind Gamification: Motivation and Behavior Change

Researchers from game industries and academia, have studied the psychology of motivation that makes games so engaging. Psychology professor Mihaly Csikszentmihalyi [26]

introduced a specific kind of happiness that he named “flow”, which is considered as one of the fundamental reasons that people play games. Flow is a state of absorption, characterized by intense concentration, loss of self-awareness, a feeling of being perfectly challenged (neither bored nor overwhelmed) and a sense that time is flying. In order to achieve flow, the important condition is a balanced goal that is challenging yet achievable within the individual’s ability. This balance is referred to as the flow channel as shown in Figure 1.

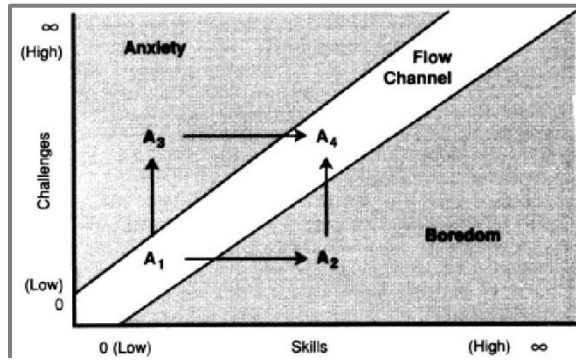
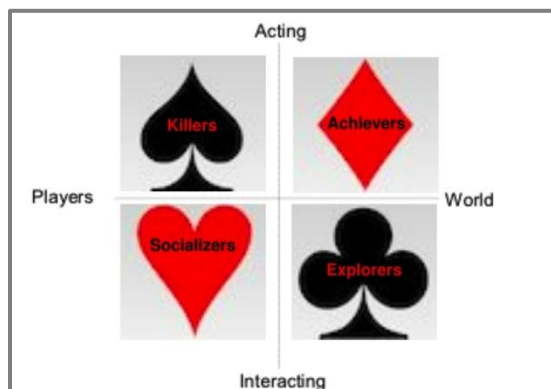


Figure 1: The State of Flow is achieved between Anxiety and Boredom [Source: Csikszentmihalyi, 26]

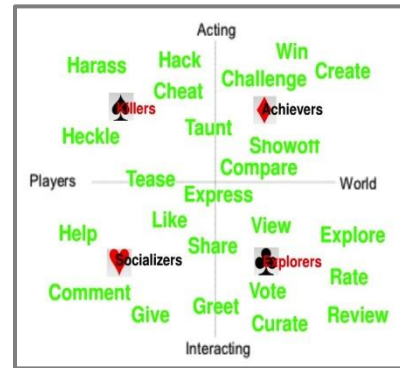
In order to understand why people play games, Richard Bartle [27] identified four player personality types by studying players of the Multi-User Dungeon (MUD) game in 1960s. The four types are based on the 2 underlying axes:

1. Achievers: driven by in-game goals, usually some form of points gathering - whether experience points, levels, or money.
2. Explorers: driven to find out as much as they can about the virtual construct - including mapping its geography and understanding the game mechanics.
3. Socializers: use the virtual construct to converse and role-play with their fellow gamers.
4. Killers: use the virtual construct to cause distress on other players, and gain satisfaction from inflicting anxiety and pain on others.

Bartle’s player type model has been the basis for understanding player motivation. Amy Jo Kim [12] applied the model in her gamification approach by overlaying social actions from the game on top of the player types, as shown in Figure 2.



(a) Bartle’s Player Types (1996)



(b) Kim’s Social Actions (2010)

Figure 2: Player Types

Stanford University researcher BJ Fogg [28] introduces the Fogg Behavior Model (FBM) to explain what causes behavior change. The model shows that three elements must converge at the same moment for a behavior to occur: (1) Motivation: the person wants to perform the behavior; (2) Ability: the person can easily carry out the behavior; (3) Trigger: the person is prompted to do the behavior.

Michael Wu [29] uses FBM to analyze why and how gamification is able to drive actions. “Game mechanics and game dynamics are able to positively influence human behavior because they are designed to drive the players above the activation threshold, and then trigger them into specific actions”. Wu suggests that gamification is an iterative process and works best when all three of motivation, ability, and trigger converge.

2.6. Gamification Design

This section describes current approaches into gamification design. It starts with gamification design 1.0, which means simply adding points, badges and leader boards in applications. After, this section discusses smart gamification that emphasizes a player’s journey to mastery in an application.

2.6.1. Gamification 1.0: Game Mechanics and Elements

Different game mechanics and elements can be used to serve different functions in satisfying players’ needs, and the basic elements such as points, badges, and leader boards are the defining attributes of the current gamification practices [Sebastian Deterding, 14]. Figure 3 illustrates these basic game mechanics and elements.



Figure 3: Gamification 1.0: Basic Mechanics [Source: Sebastian Deterding, 14]

Seth Priebatsch [7] stated that you can get anyone to do anything with 7 game dynamics. Gamification.org compiles a list of game mechanics and categories them into three types (Behavioral, Feedback, Progression) and their benefits. Table 1 lists some of the most common used game mechanics.

Table 1: Common Used Game Mechanics

Mechanics	Description / Examples	Major Player Types
Achievements	badge, completed something	Achievers
Levels	a system of reward for a cumulation of points, often are unlocked as players progress to higher levels.	Achievers
Points	a running numerical value given for any single action or combination of actions.	Achievers
Progression	success is granularly displayed and measured through the process of completing itemized tasks, such as a progress bar.	Achievers
Appointment Dynamics	at a predetermined times/places a user must return for a positive effect	Archivers
Countdown	players are only given a certain amount of time to do something.	Achievers
Quests	a journey of obstacles a player must overcome.	Achievers, Explorers
Reward Schedules	the fixed or variable timeframe and delivery of the rewards	Achievers, Explorers
Loss Aversion	influences user behavior not by reward, but by not instituting punishment. the player having to perform an action to avoid losing.	Achievers
Lottery	the winner is determined solely by chance.	Achievers, Explorers
Status	the rank or level of a player. Players are often motivated by trying to reach a higher level or status.	Achievers, Socializers, Killers
Community Collaboration	rally community to work together to solve a riddle, a problem or a challenge.	Archivers, Socializers

2.6.2. Smart Gamification

Amy Jo Kim presented “Smart Gamification” which focuses on designing an effective “Player Journey” with intrinsic reward preferred over extrinsic reward [Amy Jo Kim, 12]. Kim pointed out that game techniques are not equal to core experience and intrinsic values are greater than extrinsic rewards. Kim stated that “a good game take the player on a journey toward mastery”. When over time players progress from newcomer to regular and finally to enthusiast, they progress from novice to expert to master. When designing the journey, Kim suggests using different techniques to meet players needs, where novices need on boarding, experts need

fresh content, activities and challenges, and masters need exclusivity, recognition and impact.

Similarly, researcher Sebastian Deterding [14] not only criticized the current practice of simple gamification practices but stressed the important of “meaningful play” and proposed a user experience design around the three most important aspects: Meaning, Master and Autonomy. Deterding explained that the reason why we play is because of the meaning and autonomy with choice in the game. The mastery in the game give us fun and enjoyment. It is an adaptation to the three elements to motivate people in Daniel Pink’s [30] book “Drive: The Surprising Truth About What Motivates Us”.

2.7. Gamification Service and Platforms

There are several gamification services and platforms from by commercial companies and open source providers. They aim to meet the increasing needs of gamifying non-game applications. This section outlines the current industry players that provide gamification services via platforms or consultation services, as illustrated in Figure 4. Almost all of them are recent startups funded by venture capitals.



Figure 4: Gamification Service Industry

Open Badges [31] is a project of Mozilla with support from the MacArthur Foundation to provide a software infrastructure for issue and display of badges across the web. It uses shared badges as the recognition for all types of learning and achievement that can take place anywhere. Userinfuser [32] is an open source platform that provides customizable gamification elements designed to increase user interaction on web sites. Table 2 summarizes the services provided by the platform discussed above.

Table 2: Summary of Gamification Platforms

Platform	Licence	Game Mechanics	Analytics	Games
Badgeville	Commercial	Yes	Yes	No
BigDoor	Commercial	Yes	Yes	No
Bunchball	Commercial	Yes	Yes	Yes
Open Badges	Open Source	Yes (only badges)	No	No
Userinfuser	Open Source	Yes	No	No

2.8. Critics to Gamification

There are many debates and criticism over whether gamification itself is inherently good or bad. Many considered the current efforts of gamification focus on extrinsic motivators (such as points, badges and rewards) instead of intrinsic motivators generated by an individual's internal will or desires. Designer Stephen Anderson [1] claimed that gamification mistakes extrinsic rewards (rather than intrinsic motivation) for the power of games and hence offers only feedback, not goals & rules.

Jane McGonigal [13] spoke about her concern about current state of gamification in the GDC 2011 talk titled "We don't need no stinking badges: How to reinvent reality without gamification". She argued that current gamification confuses intrinsic/extrinsic motivation and proposed "Gameful Design" instead of "Gamification". She claimed that "Gameful is player-oriented", which presumed that the loyalty program type gamification is product or service oriented. While the current gamification is about extrinsic reward, with points, badges, and levels, gameful design is about intrinsic reward, with positive emotion, relationships, meaning and accomplishment.

Nicole Lazzaro [33] argued that the use of extrinsic rewards will decrease the motivation to use your products and services once you remove that reward. Vockell [34] resonated that in education psychology, extrinsic motivators may lead to short-range activity increase but reduction in long-range interest in a topic. While intrinsic motivators motivate people best when they are working toward personally meaningful goals.

Michael Wu [29] argues that extrinsic rewards can jumpstart intrinsic motivation. He claimed that gamification just has to work long enough for some other processes to take over as the primary driver of value. Subsequently, it becomes a secondary reinforcement system.

III. RELATED CONCEPTS

As we discussed before, gamification's main driving force is motivation. Serious games also try to solve the motivation problem and influence people's behavior. Deterding illustrates the distinctions between gamification, serious games and other related concepts. According to Sebastian Deterding et al., [16], a) Gamification is about games. It is different than playful interaction, playful design. b) Gamification uses game elements. It is not a complete game such as a serious game. c) Gamification applies to non-game contexts. Similar to serious games, it uses games for other purposes than game's normal expected use for entertainment. d) Gamification focuses on design. It is not game-based technology or a practice of wider game ecology.

A Serious game is a complete game designed for a primary purpose other than pure entertainment [Wikipedia, 35]. It includes categories such as educational games and advergames (advertising), political games, and training game (also known as game-learning). One example of Serious game is Foldit [Khatib et al., 36], which made headlines by

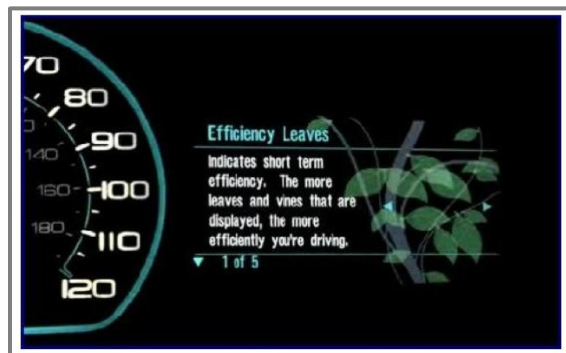
using game play to help solve problems that computers cannot solve very well. In this case, online gamers were able to do what biochemists have been trying to do for a decade: decipher the structure of a protein that is key to the way HIV multiplies.

The difference between Gamification and serious games is not very clear. Both are trying to solve a problem with game thinking. Some reference serious game such as Foldit as a victorious example of gamification in science [Khatib et al., 36]. Sebastian Deterding's [16] definition indicates that gamification can be totally different than serious games. It is interesting to see that although the concept of serious games has been around since long before gamification, gamification has arguably made steps into the mainstream whereas serious games stay in much smaller scale.

Persuasive game is introduced in Ian Bogost's [37] book "Persuasive Games, The Expressive Power of Video games". Bogost argues that video games have a unique persuasive power that goes beyond other forms of computational persuasion. Not only can video games support existing social and cultural positions, as in Serious games, but they can also disrupt and change those positions, leading to potentially significant long-term social change, as in Persuasive games. Persuasive game is closely tied to Persuasive Technology, designed to change attitudes or behaviors of the users through persuasion and social influence, but not through coercion [Fogg, 28].

Interaction design defines the structure and behaviors of interactive products and services, and user interactions with those products and services. It is design principles with main focus on behavior. For example, the "SmartGauge" dashboard for Ford's hybrid cars, where a digital plant is responding to how energy-efficient the users driving behavior is an example of interaction design [IDEO, 38]. The design gives drivers a game like interaction that for them, the game to grow more lush and beautiful leaves, a visual reward, by driving efficiently, is the desired behavior. Another example of gameful interaction design is the "Piano Staircase" created by Volkswagen Sweden and ad agency DDB, installed in a metro station in Stockholm [Thefuntheory.com, 39]. The design is to make the staircase next to the escalator look and respond like a piano keyboard, so that every step on the stair will generate different piano sounds every time a commuter walked on it. Observation indicates that 66 percent more people chose the staircase over the escalator, a good example of a "Fun Theory" design for persuading and encouraging energy-efficient behavior.

Similar to gamification, the goal of such gameful interaction design is to achieve a certain influence, a change in the behavior of their users not through a mode of informative feedback and rational processing, but through the activation of emotion or sensibility.



(a) Efficiency Leaves [IDEO, 38]



(b) Piano Stair vs. Escalator [Thefuntheory.com, 39]

Figure 5: Examples of Gameful Interaction Design

IV. CONCLUSION AND FUTURE DIRECTIONS

4.1. Conclusion

Gamification has emerged as a recognizable trend and impact so many areas of business/society whereas exists many opportunities and risks. There was a definite feeling of infancy of gamification, be it the definition of gamification or the effectiveness of gamification, there are debates from different areas of business. Most of gamification thought leaders agree that the current state of gamification is mainly focus on extrinsic rewards such as points, badges and leaderboards, and this novelty of simple gamification will have its effectiveness in user engagement before the novelty worn off. Many also see the bigger potentials of sustainable gamification with deeper researches in the intrinsic rewards from good game designs. Sebastian Deterding even introduce the term “gameful design” (design for gameful experiences) as a potential alternative to “gamification”.

Be it “gamification” or “gameful design”, the debate and the above literature surveys warrant broader academic research in this interdisciplinary area that bridges HCI and game studies and other fields to study a wide range of gamified applications. The major take away of reading the debates of gamification is that, this is a field rife with anecdotes but little hard data. The main focus of the research is not whether gamification is good or bad, but does it work or not.

4.2. Future Directions

The current state of the gamification is focus on the relatively superficial game mechanics, such as point, level, leader board

and badges. More and more researchers and commercial service providers are looking more in-depth approach to achieve engagement of whatever industries the gamification is applied on. The followings are a few directions and efforts in furthering the effectiveness of gamification:

1. Social interaction. With the social games are transforming so many non-gamers into casual gamers in a massively engaging way, the studies of social interaction in game will inevitably benefit the progress in gamification application.
2. Mobility. Mobile devices’ ubiquitousness is one of the main reason that the mobile games are invading people’s every minute in everyday life. This unique engaging factor should also be gamification’s research topic.
3. Analytics. although most of the commercial services provide some kinds of engagement metrics and behavior analytics, it is still a new area that need broader, deeper researches and experiments to find out what works and how it works.

Because gamification is relatively new field, the development of new thoughts and new areas of gamified application will emerge and change rapidly. To closely follow the future development in this field, a growing list of gamification thought leaders and their biographies is provided in the appendix as the future readings and researches.

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Yongwen Xu. Yongwen Xu is a PhD candidate in the Information and Computer Sciences department at the University of Hawaii at Manoa. His research focuses on building and studying gamification and serious games in the context of sustainability education and behavior changes. He had published ten research papers in peer-reviewed international journals and conference proceedings, and spoke on several academic and industry conferences. Previously, he worked for Oracle Corporation for 10 years as a lead software engineer and consultant in enterprise information system developments and implementations. He has a Bachelor degree in Computer Science from University of Science and Technology of China and a Master degree in Computer Science from Portland State University.