G A M I F I C A T I O N

Exploring the Effects of Game Mechanics in Changing User Behavior

LITERATURE STUDY

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PREFACE

Who, What, Why?

I am a MSc. student in Vrije Universiteit Amsterdam, specializing in Computer Science - Multimedia and Game Development. I stopped my studies for a year due to my pregnancy in 2011. And started developing apps while waiting for the baby to arrive. I have 6 applications in the App Store right now for iPhone and iPad some of which became quite successful [3 apps in top 100 in USA Social/Networking and Games/Kids category]. [January 2013] The apps I have developed have gone through phases, where they mostly started with very basic functionality and then were improved in different aspects -mostly in social sharing- and morphed into their current version. During these phases, I had the chance to see how these additional functionalities I provided has effected the number of downloads, the quality of the reviews, and how this turns into loyal users and into actual revenue. Now I am back to studying again, I decided to explore the methods which can be applied to any working product or situation, to make them more engaging, more productive and more motivational. This is how I met with the word "Gamification" which probably existed as a concept for hundreds of years but became popular in the last decade with the advent of technologies that are convenient for keeping and sharing our data so easily. Now we can track our behaviors through sensors, keep our records and compare our achievements through the internet and continuously stay connected to this cloud of profiles thanks to our mobile devices.

So, if you are interested in learning the secrets of Rail Road Tycoon game teaching young children geographical place names so easily or how Chore Wars would make your family members fight for mopping up the floors first and how IMB has used gamification to improve their employee productivity and decreased the costs of translating their product manuals, then go on and read this document.

1. INTRODUCTION

STOP!

Don't turn the page yet.

If you READ THIS SECTION of the document and you will understand the REST OF THIS DOCUMENT much EASIER.

Now, given the fact that you would understand the rest of the chapters easier by just reading this one page, would you read it or skip it? Let's see.

I just made the behavior of "reading this page" more attractive for you, didn't I?

Most of us have already experienced a form of gamification at some point in our lives. When I was 5 years old and didn't want to eat anything that had green color on my dish and my mother used to send the sweet peas one by one towards my stomach counting the number of balls that has been a "goal". That was fun. And soon after, I started making the goals myself, until I forgot about the game and it became my natural behavior. Later on in my school years, I had to finish my homework before I could go out to play with my friends. That was a rule. My parents also promised for an extra nice holiday for the summer if my school report was good. That was the prize for my achievement. My parents usually applied game mechanics to everyday activities to keep things fun and bearable for me and my brother.

As we grow, things get more serious and less fun and perhaps -for some of us- even boring. No fancy graphics on every page of the book we are reading to engage us with the story, nobody clapping hands because we ate that healthy apple instead of a pack of junk food, and no reason why we would take the stairs at work instead of taking the elevator -which is obviously faster and makes us less tired in the short term.

We have to have an inner motivation to make us do these things which are (supposably) right but not giving too much positive feeling right away. The feedbacks after our achievements are not instant anymore as they were in the small games our parents used to turn everyday activities into. My friends will start warning me only after they see visible signs like a big weight gain, or I will start worrying about my bone density only after I break a bone. And only after that, perhaps I will start drinking milk every day, and walk at least 1 hour everyday in open air to get some sun and to take the stairs to generate more bones using the calcium and vitamin D. Having the inner motivation to do things might not be easy. What if walking that long everyday doesn't fit my life style. I am an application developer living away from my home country. I work in front of a computer, I have a sedentary life style. Why would I now, go for an-hour-long run, and be bored by the routine? I enjoy seeing new things, I am curious, I like being multifunctional and I am social. I want to run for being fit, but just being fit is not motivational enough for me.

I recently found a way to make an active life style more attractive for me. I started using Nike+, FitBit and Run Zombies, which I will explain later as one of the successful examples of gamification. Thanks to these products, I can now not only track my activity continuously, but also be social with my friends living far away from me. Previously, nobody would know I ran for an hour, and I would feel that hour lost. But now I get badges for my achievements, share my experience with my friends and get feedbacks instantly which make me happy and more motivated to go for a run everyday. I put my earphones on, listen to the narrator telling me where to go to find the loot on Run Zombies, feeding my curiosity at the same time I am accomplishing a routine task. Technology combined with gamification has now allowed me to relate my real life achievements with instant feedback and rewards, which is giving me an immediate positive feeling and motivation to continue what I am doing.

Of course you may have experienced different versions of gamification than me. We have different personalities thus we may have different motivation factors. I might be more caring about being social and multifunctional. On the other hand, you might be just running to be the fastest in the world and achieve all possible fitness and speed related goals. Knowing that the users will all have different incentives, the question is: what is the best strategy to apply gamification so that we

can all benefit from it? Keeping in mind that the behaviors the product owners want us to change would also be different, we can say: gamification does not have a single definite recipe. It is different for every person and for every situation. We can only combine the game elements that will give a more positive feeling, and that fit to our general user profile and product.

In this paper, I will try to define gamification and layout these game elements and building blocks of gamification and how they were used in the canonical examples which have been successful in changing user behavior and conclude with how we can use it to change behavior of Second Screen users and what possible future research questions could be asked on this subject.

Ding!

Now you are a Level 2 Gamification Apprentice!

You should read the following chapter in order to become a Level 3 Gamification Expert.

2. GAMIFICATION

2.1. Definition of Gamification

The word gamification is an English noun, "gam(e) + -ification, that is derived from the verb "to gamify"[1] which means to turn something into a game. According to gamification.org, the word "gamification" has been first used in March 2004. Although this etymological definition, gamification does not only mean making a game.

Gamification expert Gabe Zichermann (2011) defines gamification as "the use of game-thinking and game mechanics in non-game contexts in order to engage users and solve problems"[2]. In his book Gamification by Design, he mentions different examples in which gamification has been used to solve numerous problems from changing people's behavior in everyday life to making users more engaged with the product they are using.

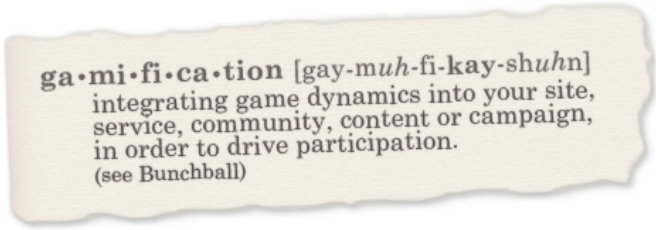

Figure 0: Gamification defined by Bunchball

In order to understand gamification, we should first look at the elements that make a game. We can then use these elements in a non-game context to make it more positive.

2.2. Definition of Game

In Rules of Play: Game Design Fundamentals book, Katie Salen and Eric Zimmerman (2003) described a game as "a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome." [3]

Karl M. Kapp (2012) modified this generalized definition into: "A game is a system in which players engage in an abstract challenge, defined by rules, interactivity, and feedback, that results in a quantifiable outcome often eliciting an emotional reaction"[4]. Even though he added new features to the definition of a game for adapting it to the learning context, he still kept the main components: the challenge (conflict), the rules and the outcome(feedback and result).

By using these basic components that make a game, decoupled from the context, we can gamify any task.

2.3. Why People Play Games?

In order to understand why gamification could be useful, we can first look at the reason why people play games. "The player is at the root of gamification and player's motivation drives the outcome." says Zichermann (2011).

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[1] http://gamification.org/wiki/Gamification

[2] Zichermann, Gabe. Gamification by Design Implementing Game Mechanics in Web and Mobile Apps, O'Reilly, 28 October 2011, ISBN: 978-1-449-39767-8

[3] Salen, Katie. Zimmerman, Eric. Rules of Play: Game Design Fundamentals, MIT Press, 10 January 2003, ISBN: 978-0-262-24045-1

[4] Kapp, Karl M. The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education, Pfeiffer, 1 May 2012, ISBN:978-1-118-09634-5

While Zichermann (2011) lists a few human motivators as de-stress/fun, power/status, mastery, socialize, Yu-kai Chou[5] (2012) extends these derives to eight.

According to Yu-kai Chou gamification is a human focused design as opposed to function focused design. He claims that most of the designs are focused on getting the functions done. But we should also think about the human integration in the process and think of what human desires are and what motivates them. He published a Gamification Framework called Octalysis which can be used to analyze certain activities and the human desires they satisfy and as a result to choose the right strategies and game elements to make those certain activities more engaging for humans. Octalysis consists of 8 "Core Derives" that motivates humans:

- Epic meaning
- Accomplishment / Power / Status
- Empowerment / Mastery
- Ownership (Customization, Collection)
- Socialization
- Scarcity
- Unpredictability
- Loss / Avoidance

Below is a list of game elements according to Yu-kai Chou which are relevant with these eight Core Derives:

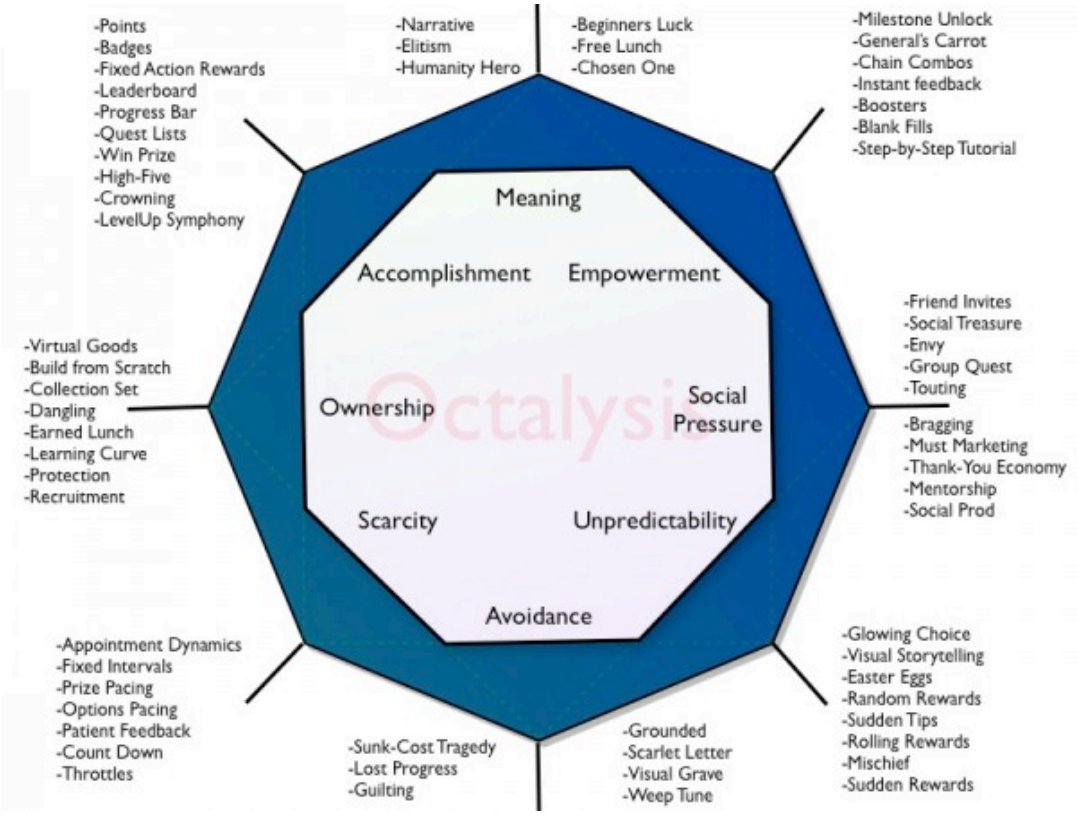

Figure 1: Eight Core Derives and relevant game elements by Yu-kai Chou

[5] Chou, Yu-kai, Octalysis: An Actionable Gamification Framework from an Industry Pioneer, 02 December 2012

2.4. Types of Players

The motivators listed in the previous section are derived by who the player is and what their personalities look like. Richard Bartle[6] (1996) has come up with four player types which were mainly aimed for MUD games: Achievers, Explorers, Socializers, Killers

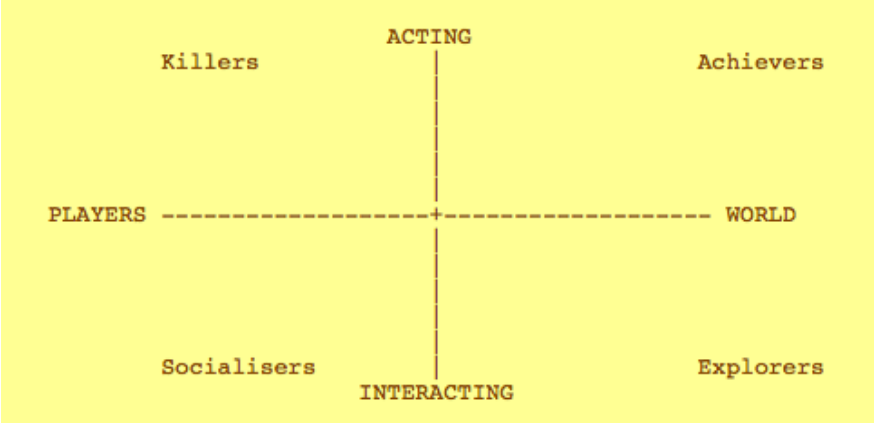

Figure 2: Placement of player types by Richard Bartle

The player type can be found by taking a Bartle test[7], or simply by writing down the verbs or actions that would describe our player.

According to Amy Jo Kim[8] , different genders have different aims. While males are more competitive, females tend to collaborate more she states. Kim also mentions one more player type that Bartle hasn't considered: self expressionists.

If we combine these two models we come up with 5 different player types and action words respectively:

1. Achievers: Gain, win, challenge, fight, brag, pass, show off, taunt, compare
2. Explorers: Explore, view, read, search, collect, curate, complete, find, vote, rate, review
3. Socializers: Join, share, exchange, gift, trade, help, greet, like, comment, give, recommend
4. Killers: Kill, beat, pass, compete, harass, argue
5. Self expressionists: Choose, customize, layout, design, dress up, decorate, make, create, pick, like, purchase

Player styles are mutually inclusive, meaning a player can have all of the above characteristics at the same time.

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[6] Bartle, Richard. Hearts, Clubs, Diamonds, Spades: Players Who suit MUDs, 1996, http://www.mud.co.uk/richard/hcds.htm

[7] Bartle Test, 28 August 1996 http://www.gamerdna.com/quizzes/bartle-test-of-gamer-psychology

[8] Kim, Amy Jo. Smart Gamification: Seven core Concepts for Creating Compelling Experiences, Casual Connect Seattle, July 2011, http://casualconnect.org/lectures/business/smart-gamification-seven-core-concepts-for-creating-compelling-experiences-amy-jo-kim/

Player types can be applied to other media too. For example, if we look at the keywords researched by Nielsen[9] (2009) on what people who are using a smart phone or tablet while watching TV talk about, we can deduct the player type of these people as: socializers, achievers and explorers.

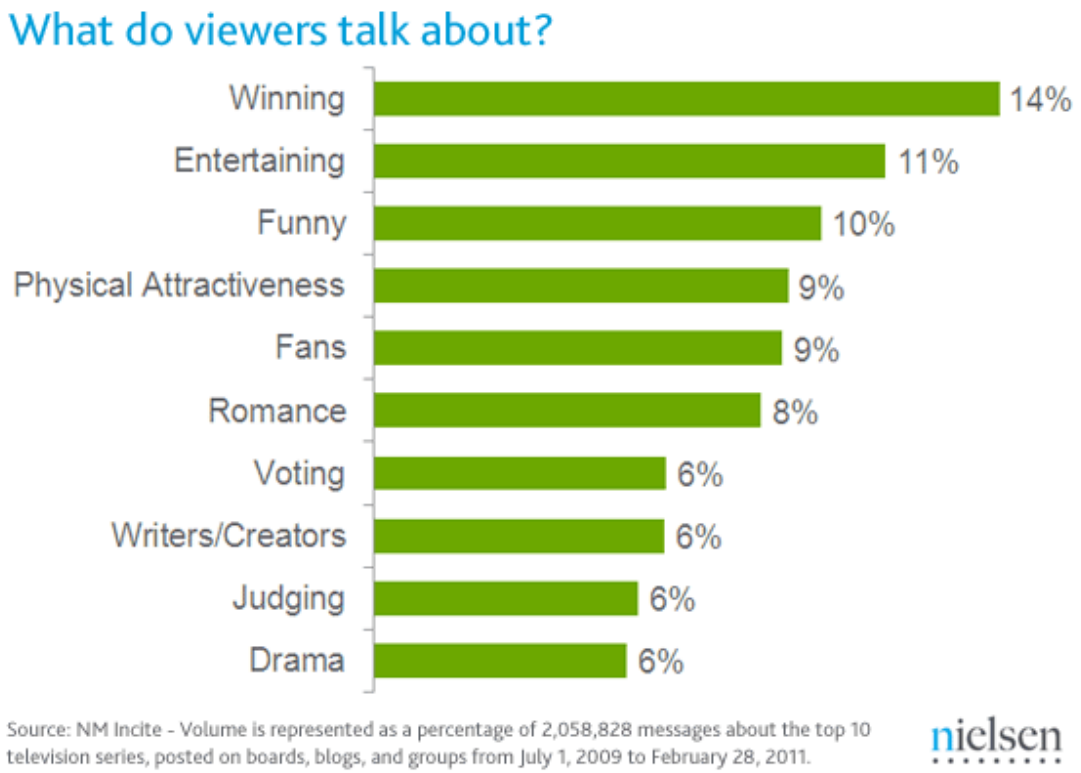

Figure 2: Keywords that can be used to identify people who watch TV and use social media at the same time

2.5. Why Gamify?

A more philosophical and general definition of the word 'game' was mentioned by Suits(1978) and quoted by McGonigal (2011) as: "Games are unnecessary obstacles we volunteer to tackle."[10] An example given by McGonigal (2011) was golf. Instead of walking as close to a hole as we can and putting a ball in that hole directly by hand, we walk as further from the hole as we can and hit the ball with a stick and call this the game of golf. By choosing a less efficient way of doing things, or applying rules that make certain tasks harder for us, we make sure there is a eustress, a positive and healthy stress, a feeling of fulfillment in the process. After accomplishing the task with enough unnecessary obstacles added, we will have the feeling of accomplishment and have positive feelings. The reason why we game, is because of this feeling of "blissful productivity"[11] according to McGonigal (2011). "With each accomplishment," she states that "our brains release a potent cocktail of norepinephrine, epinephrine and dopamine", three neurochemicals when combined make us feel satisfied, proud, and highly aroused. (McGonigal, 2011)

The same concept is also mentioned by Zichermann (2011) giving the example of making broccoli more attractive for children to eat by making games and at the same time adding melted cheese on top of it as a reward, he states that: "the

[9] Social Media and TV - Who's Talking, When and What About?, NielsenWire, 11 October 2011, http://blog.nielsen.com/nielsenwire/global/social-media-and-tv-whos-talking-when-and-what-about/

[10] Suits, Bernard. The Grasshopper: Games, Life and Utopia, Broadview Press, 9 November 2005, ISBN-13: 978-1551117720

[11] McGonigal, Jane. Reality Is Broken: Why Games Make Us Better and How They Can Change the World, Penguin Books, 27 December 2011, ISBN-13: 978-01433120612

interplay among challenge achievement and reward not only allows you to train children to eat their broccoli, but it releases dopamine in the brain, intrinsically reinforcing the action as biologically positive."

Both Zichermann (2011) and McGonigal (2011) are stating that there is a positive feeling after playing a game.

Given the mechanics that make a game desirable, why wouldn't we put them in real life routines and productive actions and try to turn them into fun and engaging activities?

According to a research done by Stanford University, the collective number of hours spent by gamers on playing World of Warcraft, tackling unnecessary obstacles, is 5.93 million years. When we look at the big picture, she compares this time to the amount of time that has passed between now and since our first ancestors first stood up as human species.

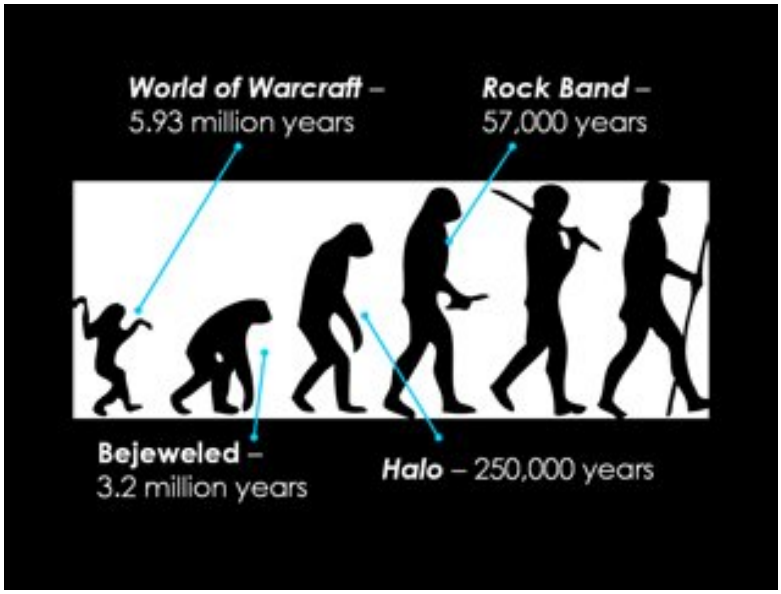

Figure 3: Comparison of evolution of man with the collective amount of time humans have been playing certain games

Karl M. Kapp(2012) claims, if applied correct, gamification has "the power to engage, motivate action, inform, educate and solve problems".

Considering all above are true, if we have gamified our tasks to be done, perhaps we could achieve a more accomplished world or a better version of ourselves, learning, engaging and at the same time enjoying.

2.6. Building Blocks

There is no single rule for gamification that can be applied for every situation. Instead, gamification may be achieved by combining many different elements. However there are some characteristics of gamification which are fundamental to every application. Here are the building blocks of gamification that are very crucial for a successful application.

2.6.1. The Fun Factor

The first building block of gamification is to make it fun. If we start with the idea of education and put fun second, "learning doesn't seem to work as effectively" says Zichermann(2011). One of the examples he gives is Civilization and how it thought millions of people history lessons and basics of urban planning without forcing it onto them. This is the "positive emotion" mentioned by Kim (2011) and McGonigal (2011) that puts our minds in a state of optimistic engagement, biologically making it possible to think positive thoughts and to make social connections.

2.6.2. The Flow

The flow is a mental state where a person is neither anxious nor bored. "It is a state in which people are so involved in an activity that nothing else seems to matter."[12] proposed by Mihaly Csikszentmihalyi. According to his theory people are happiest when they are in the "state of flow". This is a crucial ingredient of gamification, so the players are concentrated in their activities and motivated to continue the action for longer periods of time when they have enough skill level and the challenge level is high enough, but not too high. If the challenge is too hard they get frustrated, if the challenge level is too low they get bored. Based on the studies made on annual Game Developers Conference 2006, gamers spend 80 percent of their play time failing. McGonigal reasons this love of failing with when people fail knowing that they had the skill to succeed, they get hopeful, excited and more interested and try one more time.

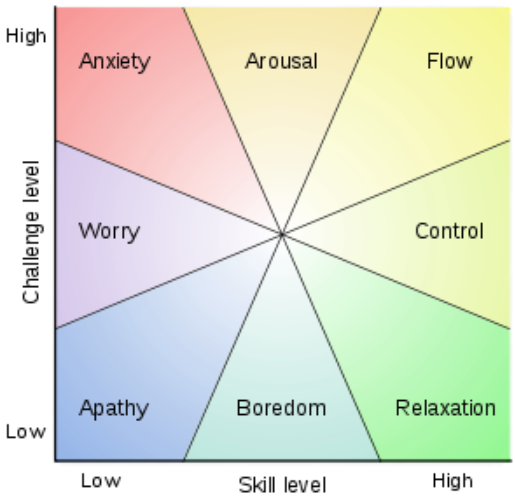

Figure 4: Mihaly Csikszentmihalyi's flow model

2.6.3. Challenge

In order place the player in the middle of flow we may need more than one type of challenges. Tom Chatfield proposes[13] to separate short term challenges from long term challenges so that players don't have to wait too long before they get a feedback once their tasks are complete. He also thinks providing multiple challenges to choose from will keep the players from all levels interested. The users can choose the challenges which fit their skill level, without being frustrated by the heavier challenges nor being bored by the tasks that are not challenging enough for them.

2.6.4. Feedback

Feedback is defined as "returning information to the player for informing them of where they are in their progress" by Zichermann (2011). Chatfield(2010) thinks when consequences are too far away, people tend to forget about them. To prevent this Chatfield proposes to provide an instant and clear feedback to all challenges and as frequently as possible.

2.6.5. A Reward Mechanism

Games by definition result with an outcome. Chatfield (2010) says every effort should be rewarded even for trying and failing. The users experience never goes backwards. This way, the user doesn't have a discouraging punishment when he fails to be successful. Experience bars or points which show the constant progress are a good example for such an ongoing reward mechanism.

[12] Csikszentmihalyi, Mihaly, Flow: The Psychology of Optimal Experience, 1990

[13] Chatfield, Tom. 7 ways video games engage the brain, TEDGlobal, November 2010

2.6.6. Element of Uncertainty

Both Chatfield (2010) and Zichermann (2011) agree on providing elements of uncertainty in our gamification experiences to achieve the high reinforcement level. According to the researches done using a Skinner box and rats who are given food after pressing a bar, it is found out that if the rewards (the food) always come in fixed intervals with fixed sizes, the mammals can calculate when they will get a reward and how big the reward will be. This fixed ratio in reward systems may not be appealing after a while. And the player (the rat) will only go and press the pedal when he estimates the food will drop. On the other hand, if the reward mechanism is a mix of variable quantities, sizes and intervals; for instance if they continue pressing on the bar there is a chance that they may get a very big reward at some unknown point in time, they tend to continue trying until they get the reward. Such as the lab rat given varied amounts of food after 2 bar presses, 6 bar presses and 4 bar presses and he cannot keep track of when the food will come but he knows if he presses enough the reward will come, he keeps on pressing until the food comes. This is called a variable ratio (VR) in behavioral reinforcement shown on Figure 5.

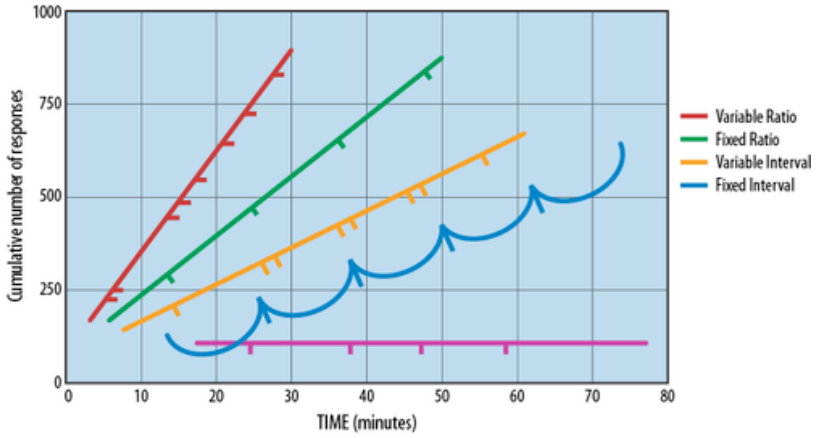

Figure 5: Different reward schedules producing different levels of behavioral reinforcement in mammals

2.7. Game Dynamics (Challenge and Reward Mechanisms)

As mentioned earlier in the definition of gamification, we need to apply game thinking, game mechanics and game dynamics to a non-game context. Game dynamics are the reward mechanisms and challenges we use in games. They can be used in combination with each other to make the game more challenging.

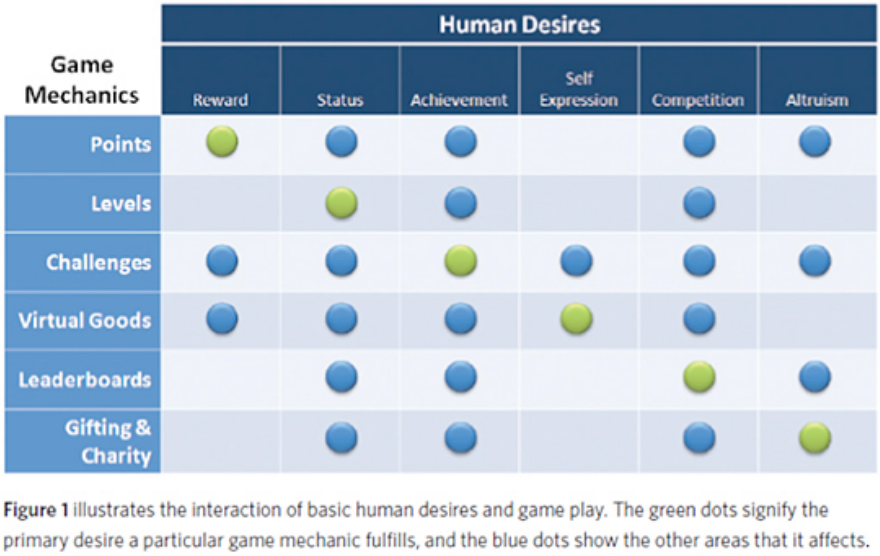

Figure 6: Game Mechanisms(mentioned as Game Mechanics in the image above) based on motivation factors by Bunchball, Inc.

2.7.1. Point System / Score

Points are the basic elements of gamification which people can use to compare their score with others. All other game dynamics could be derived from points. A real life example is the amount of money we have in our bank account showing our income status. It is obvious that the more money one has, the richer that person is perceived.

Points can be given different meanings according to the context they are used in. For example: experience points in an e-learning application, redeemable points in an online game with a store, skill points in a Role Playing Game, reputation points on an online forum or online shopping where these points effects the trustworthiness of the players.

Point system is aimed at achievers who like scoring the best.

2.7.2. Levels

Levels indicate progress. They are both for achievers and explorers. Levels are a sign of mastery as the difficulty of the challenges increase on each level.

According to Zichermann (2011) while the exponentially increasing level difficulties make it predictable and boring, the variable complexity transitions as in Angry Birds are proven to be addictive and engaging. While the first levels of Angry Birds gain the player confidence and experience, they suddenly hit a big challenge on level 21. Players may drop out or feel the part of an exclusive group by passing this level and unlocking a whole new board of levels.

On the other hand, Jon Radoff[14] thinks this type of a midgame challenge is the main reason for many players to drop off.

Depending on what a product needs, we can design the level progression accordingly.

2.7.3. Badges / Achievements

Badges are signs of achievements. They are for collectors. Mainly aimed at players who like to show off and share their status or accomplishments. For example, the logo behind every car is a badge, implicitly and simply showing the quality of the car and the status of the owner. Or on FitBit[15], each badge shows an accomplishment, namely the amount of steps you have taken. Each badge has a pre-defined milestone as a challenge. Users see the next possible badge they can achieve. And when the user reaches a milestone he is rewarded with a badge describing his achievement. On the other hand, on Four Square[16] the badges are unknown to the user. The users can discover these badges as they check-in to places. Both badges give the players a chance to brag about what they have been doing, and how good they are at doing it.

2.7.4. Leader-boards

Leader-boards are a list of names of the players ordered by their relevant scores. Leader-boards are mostly useful for killers. They get motivated by seeing other players' scores, trying to beat them. While designing a leader-board, it is important to not only show the top players scores, but actually to show the players just above and below our current player. This gives a reachable goal to the player, increasing his or her motivation to beat the next closest by player or not to be beaten by the players just below him.

2.7.5. Quests / Challenges

Quests are certain tasks to be done. Some quests can require a time limit or other rules which might bring in more obstacles to the completion of the task. These quests are challenges. Quests and challenges give an aim to the players. It is more engaging to have multiple quests and challenges at the same time, so that the players from all stages of mastery (novice, problem solver, expert, master, visionary) are in the flow. For educational applications of gamification, Kapp

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[14] Radoff, Jon. Game On: Energize Your Business with Social Media Games, 12 April 2011, ISBN-13: 978-0470936269

[15] FitBit, https://www.fitbit.com/

[16] Four Square, https://foursquare.com/

(2012) claims that unless the learner is overcoming challenges, no higher-level learning will occur. The challenges and quests help users enter the flow and escape boredom.

Some example challenges could be:

- the time a user takes to finish a certain activity
- achieving to collect a certain number of items
- repeating an action for a certain amount of times
- completing a certain task

2.7.6. Virtual Goods

Virtual goods are mainly aimed at explorers and players who like to express themselves. For example, giving the opportunity of buying additional objects and widgets to players so they can customize and decorate their rooms in the online application Habbo Hotel[17] is making a successful use of virtual goods.

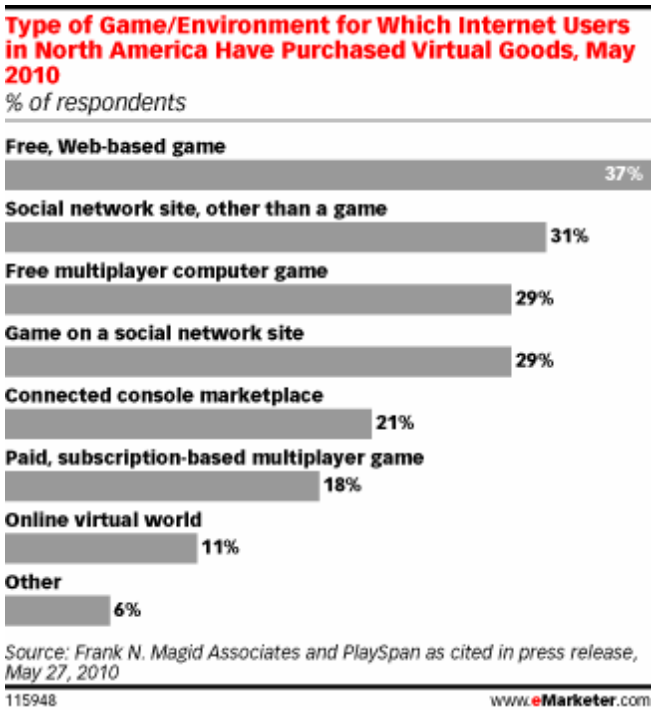

Figure 7: Most frequent places to buy virtual goods

2.8. Game Mechanics

According to Wikipedia, game mechanics are the rules intended to produce a gameplay. They include interactions and the actions the players will be taking during a game that have immediate feedback or result. Various game mechanics can be combined to form a basic gameplay. Some examples are listed below. Each of these mechanics can also be used in different contexts and can be combined with each other to create a more complex game play. While a gameplay is a design concept, game mechanics can be listed as engineering concepts, each mechanic representing a single action which will result in an instant feedback. For example while a gameplay is consisting of fighting, the game mechanics can be broken down to: kick, hit, attack, block, defend, punch, dodge, throw.

[17] Habbo Hotel, http://en.wikipedia.org/wiki/Habbo

2.8.1. Surprise and Unexpected Rewards

A slot machine is a gambling machine which works with turning wheels stopping at random images. When the images match a specific pattern the machine pays a reward to the player. Instead of providing a precise reward mechanism, providing a combination of probabilities engages the users more with the action they will be taking, keeping them in the "flow". "An element of uncertainty" keeps the players going.

Finding hidden objects is another game mechanic especially aimed at explorer player type. The player can get immediate feedback after finding a hidden object.

Just as in finding hidden objects, a surprise factor could be also achieved by discovering new rewards as the players keep on playing in our gamified system. A good example is the unique and funny badges given by Four Square at undocumented and unexpected times.

2.8.2. Collecting

Many people have collecting as a motivator. The items that are being collected can be anything. While offering limited collectible items could be more interesting for achievers, adding a trading mechanism to our application could be more attractive for socializers.

2.8.3. Pattern Recognition

Humans are good in recognizing patterns. Memory games, finding hidden items are some examples. Combination bonus points could be attractive for the achievers, as they would try hard to get as many challenges as possible done.

2.8.4. Creating

Many people enjoy being creative. Game mechanics which include creating something with a visible or tangible outcome attract the self expressionists as well as the achievers and explorers.

2.8.5. Hitting and Shooting

Hitting and shooting or avoiding being hit or shot is another game mechanic mainly used in First Person Shooter or fighting games. This game mechanics attract killers and achievers.

2.8.6. Growing

Another game dynamic could be growing a virtual object or creature. Some people like caring for things that are vulnerable. They are mostly played by self expressionists and explorers. Giving a shape to the life of a virtual being is for self expressionists, and unlocking all the possible growth paths or functionality that can be used is for explorers.

2.8.7. Looting, Grinding, Buying and Selling

Games such as Monopoly are based on the game mechanics buying and selling.

Other more complex games such as the MMO game World of Warcraft use these game mechanics as a part of their gameplay. Though the main goal of the game is not buying and selling, the users go through these game mechanics during their gameplay in order to improve their characters and their equipments in the virtual world. When a user defeats a non-player entity, he can pick up the items that drop from the enemy as a reward. These items can either be turned into virtual money by being sold in the auction house provided in the game or they can be traded with other users who have other objects of interests in return.

Grinding is getting an item as a reward by repeating a specific action a few times.

Looting, grinding, buying and selling attract all types of users because there is a social interaction in trading, an achievement factor in grinding and a winning and losing factor in looting, and a self expression opportunity in buying and selling.

2.9. Aesthetics

The look and feel, the art and the beauty of a project is called aesthetics.

The visual elements play an important role in player engagement. A good looking project can add a lot to the immersiveness and increase the overall game experience of players. As mentioned earlier, the projects become more boring without aesthetics.

Kapp (2012) mentions that life-like avatars and third-person perspective are more effective in behavior change. As users start to associate themselves with their avatars, they try harder to get better in a certain activity.

3. CANONICAL EXAMPLES

Fortune "Gamification is the hot new business concept, with many of the world's most admired companies signing on." It is being applied more and more to everyday life to change user behavior and to make the existing products more engaging.

Below are four successful examples using gamification to motivate people walk/run/climb more and to improve health. And two other examples that use game elements, aesthetics and social networking for user engagement.

3.1. FitBit

FitBit is an example of gamification of healthy practices. It offers detailed reports of your daily activities such as steps taken, stairs climbed, tracking sleep activity and calories taken in and lets you compare yourself with others. The information is very much to the point, and if the tool is used regularly one can see their faulty behaviors during the day with instant feedbacks. For instance, eating a bar of chocolate instantly gains a person 500kcal or that one have been very sedentary on a single day, and has to spend 2000 more kilo calories in order to achieve his/her preset goal of losing weight.

It also makes use of badges and has long and short term goals to keep people synched everyday. And for socializers there is always a share option where they can share their progress and status anytime and the forum where they can join groups add friends and arrange public events.

By simply just tracking and reporting user information and comparing them, FitBit has managed to create a social engagement loop and a successful gamification example of health.

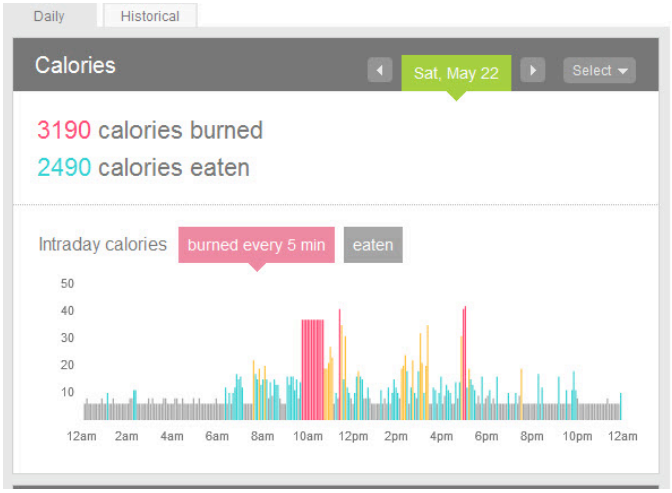

Figure 8: FitBit calories burned vs calories eaten report

Figure 9: FitBit Badges

3.2. Nike Plus

Nike Plus is another successful attempt to gamify running, using a tracking device and an online application connected to social networks. It uses game mechanics such as progress bars, levels, challenges and badges as well as letting people share their experiences and cheer each other for more motivation. The users can join missions consisting of an imaginary story for making running more engaging.

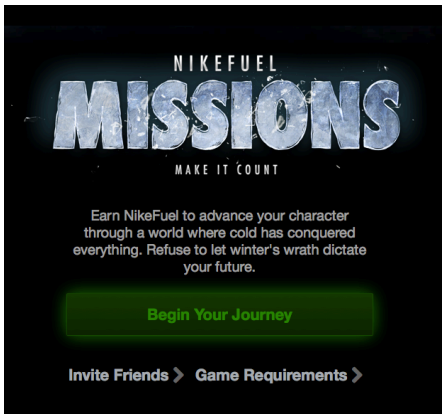

Figure 10: Nike Plus Missions

Nike Plus has gone one step further and also integrated sensors with an XBox Kinect training[18] fitness program which makes sports even joyful when you are home.

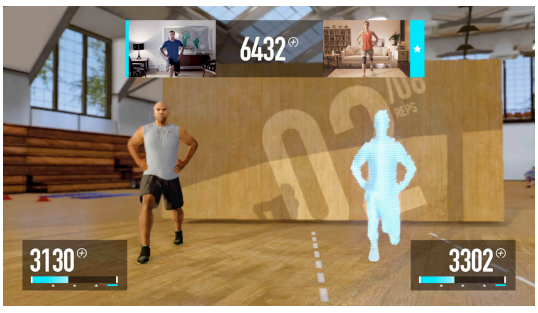

Figure 11: Nike Plus XBox Training

[18] Xbox Kinect Training Nike Plus fitness program,
http://marketplace.xbox.com/en-US/Product/Nike-Kinect-Training/66acd000-77fe-1000-9115-d8024d53090f

3.3. Zombies, Run!

Zombies, Run![19] is another example application which is dedicated to turning running into fun.

Instead of running on your own, if you use Zombies, Run! application, you will be directed through a story which goes around the user in a virtual environment where the user can collect items for their quests. This application draws the players into a story, engaging the explorers and achievers with running activity.

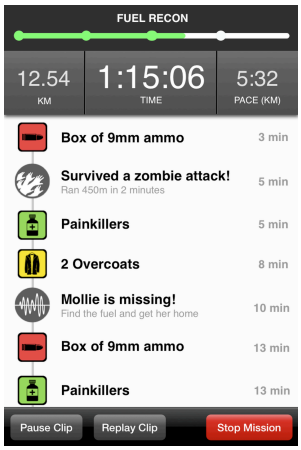

Figure 12: Zombies, Run Game

3.4. Piano Staircase

The fourth example which uses gamification to make people take healthier actions is the Piano Staircase project by The Fun Theory. To cope with the lack of physical activity and to make people in metro take the stairs instead of the elevator, The Fun Theory added a mechanism on the stairs so that when people walk on it they make music. By adding this fun element into an every day activity, the number of people who used stairs increased by 66%.

Figure 2.1: The Fun Theory's Piano Staircase

Figure 13: Piano Staircase by The Fun Theory

[19] NPR Staff, Zombies, Run, February 2012, http://media.npr.org/assets/img/2012/02/17/run-screen_custom-a209c7cc21eaf02f24521d65776453fb12e5af59-s6-c10.png

3.5. Farm Ville

Farm Ville by Zynga is a farming simulation game targeted for socializers. It is a successful monetizing example using duel economy game mechanics. It is free to play, but it gives the players the option to purchase additional content. Zynga uses both farm coins and farm cash to allow users purchase virtual content. According to Zichermann (2011), by using more than one type of currencies to purchase different content, players lose track of the worth of content they are about to purchase. Another example from Farm Ville is to offer players extra points, if they choose to promote the game on their social network applications such as Facebook.

3.6. Chibi Me

Chibi Me is an avatar creator for iPhone, iPod, and an extended avatar creator with a dress-up function for iPad. Targeted for kids and teenagers between 7 and 16, to create a chibi[20] version of themselves and their friends and save it as an image on their phone's photo library and use them as their avatars in social media to represent themselves.

3.6.1. Increasing User Engagement

The very first version of Chibi Me didn't have direct Facebook or Twitter connection. When these two sharing options were added, the users started sharing the images they created. The in-app sharing functionality made the sharing easier and more obvious compared to saving the final result to their photo library and not knowing what to do with it. Consequently showing the user the way to go, or giving them direct instructions about what to do next could be useful while gamifying existing projects. Implementing this social sharing functionality not only made the users recognize the behavior this app was intentionally built for but also allowed Chibi Me's Facebook and Twitter fan page grew to what it is today[21].

3.6.2. Changing Quality and Quantity of Reviews

Another improvement was the allowing the users to get a taste of the in app purchase packs for free. While in the iPhone version, the users could make in app purchases for extension packs, there was no free pack to try and see how an extra pack would add to the fun factor. After the release of the iPad version where people could also dress up the whole avatar, there was a recognizable difference in the number of downloads. Even though the iPad version offered a more extensive editing of the avatar, the number of users were far less than the iPhone version. This was an obvious outcome of the number of teenage iPads users being less than the combined number of teenage IPhone and iPod users. Later on, after the addition of a free pack to the iPad version where the users could download to see what they would get if they had bought a pack. People only had to write a review in order to get this pack. And the result was visible in no time: even though the number of iPad users still remained below the iPhone version, the number of reviews ten-folded the iPhone version, in 90% of which the users are recommending the app to their peers and giving a 5 star review.

3.6.3. The Elder Game

Lastly, when Chibi Me was first developed, there was no transparent pack which allowed advanced users who have photo editing and collaging skills to export the chibi images as .PNG files with a transparent background and paste them on their own photos creating a photo montage effect. Later on, after the addition of this pack for more advanced users, we started seeing Chibi Me being used in combination with other photo editing and sharing apps, resulting in what I called an Instagram peak[22].

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[20] Japanese word for short person, used to describe the little child like character drawings in manga and anime style.

[21] 1740 Facebook followers and 424 Twitter followers by January 2013

[22] There was a sudden and sharp increase in the number of downloads after some users started sharing Chibi Me photos on Instagram. 1781% increase in 1 week.

	GAME ELEMENTS							
EXAMPLES	BADGES	CHALLENGES	POINTS	SOCIAL CONNECTION	FUN	VIRTUAL GOODS	LEADERBOARDS	LEVELS
FitBit	x	x	x	x			x	
NikePlus	x	x	x	x	x		x	x
Zombies, Run!		x	x		x	x		
Piano Staircase					x			
Farm Ville	x	x	x	x	x	x	x	x
Chibi Me	x			x	x	x		

Figure 14: Comparison of various game elements used in above examples

4. CURRENT ISSUES OF INTEREST

4.1. Gamification In Use

The previous sections of this document described gamification and the elements that take a role in the implementation of gamification. This section will list some of the areas which gamification could be applied to change user behavior.

4.1.1 Solving Business Problems

From teaching the pilots how to fly a plane using a flight simulator and avoiding real failures, to enterprises benefiting from community help, gamification is being used by many different companies to solve their business problems.

One good example for the companies who are solving their business problems using gamification is IBM[23]. IBM uses a award systems for their employees using points and badges. When the employees volunteer to complete a certain task they get points. And the points turn into bonus payments for the employees with highest points. This way, IBM employees voluntarily translated the product manual and reduced the cost of translation dramatically, and increased the quality of translations. According to Tim Royle[24], the gamification system used in IBM also increased organizational performance.

4.1.2. Education

Gamification may help ease learning or can make learning more fun and engaging. According to Gamification.org edutainment is a form of education which is designed to be entertaining in order to keep people interested and engaged.

However Lee Sheldon[25] (2011) states in his book The Multiplayer Classroom, the problem with most educational software is that the EDU comes before TAINMENT, meaning the education is given a higher priority then the fun factor.

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[23] Fidelman, Mark, Why IBM Represents The Future Of Social Business, http://www.businessinsider.com/want-to-see-the-future-of-social-business-2011-7 , 20 July 2011

[24] Royle, Tim, Gamification: Unlocking hidden collaboration potential, https://www-304.ibm.com/connections/blogs/socialbusiness/entry/gamification_unlocking_hidden_collaboration_potential2?lang=en, 2 February 2012

[25] Sheldon, Lee, The Multiplayer Classroom: Designing Coursework as a Game, ISBN: 978-1-4354-5845-1, June 14,2011

Some people might be bored by reading pages of information without any interaction or a mechanism which motivates them to continue reading and learning. They might be more inclined to learn via sight or simple metaphors. They might not be the right audience for just a book full of pages of literals. They might just be having different priorities. Reading is a way of learning, but there can be more than one ways. Just as a teacher explaining a subject in a classroom is. There can be more ways to achieve the goal "education". Using well-designed game mechanics, targeting on the right audience we might increase the speed and quality of learning.

4.1.3. Awareness

Games can help awareness. As McGonigal (2011) says: "Play it, before you live it. The best way to change future is to play with it first." Gamification can help people be aware of situations which have not yet occurred or situations which are in the process of occurring but which are not in a recognizable phase yet. In the alternate reality game World Without Oil[26], McGonigal has proven that there are people which lived their lives as if the world was really without oil. They have faced the problems as if they were real, and tried to find solutions. This not only created an example picture of the future if it was left without oil, but also helped those players be aware that this might be the case if we are not careful with the world's energy resources we currently have.

We could also use gamification for increasing awareness in health or in environmental issues.

4.1.4. Marketing

Increasing awareness is not only limited with environmental issues or health. It could also be increasing brand awareness, making people familiar with products, explain them why it might be of their interest to use some products or to become a loyal customer of a company.

4.2. Criticisms

There are debates and criticisms over a few concepts about gamification.

4.2.1. Intrinsic vs. Extrinsic motivation

Motivation is divided into two groups in psychology: Intrinsic and extrinsic. Intrinsic motivation comes from with in, it is the direct willing to take an action by yourself. On the other hand, extrinsic motivation is derived by other factors around us, such as making money.

One of the criticisms is questioning if elements used as extrinsic motivators increase or decrease users' natural motivation and loyalty.

According to Daniel H. Pink[27] extrinsic motivators like cash do not work in creative thinking. When the players get used to being payed or awarded by goods, and when there comes a time without the payments, the players totally lose their motivation due to lack of external motivator. According to Zichermann (2011) this could be true but he also claims that other rewards such as 'social status' might be more motivational for players.

Gamification uses extrinsic motivators to engage the players. However, this may result in losing the intrinsic motivation. As an example Zichermann (2011) gives a child playing the piano simply because she enjoys it. And when we introduce her to competitive piano playing with rewards, if she fails to get the reward this may result in her stopping to play. Thus, extrinsic motivation crushes intrinsic motivation.

4.2.2. Leader-boards

Another criticism is over implementing a leader-board in your projects. Some players do not enjoy seeing themselves listed among other players. And the leader-boards which show top scorers can be very disincentive if the list of scores are not meaningful to them, full of numbers which don't indicate what those users have done to get it.

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[26] McGonigal Jane, World Without Oil, 2007, http://www.worldwithoutoil.org/

[27] Pink, Daniel H. Drive: The Surprising Truth About What Motivates Us, ISBN: 978-1594484803, April 5, 2011

According to Zichermann(2011), if we put the user in the middle of the leaderboard and show who is above and below him, this can be a better incentive. Also we can create different leaderboards that may be of user's interest such as a leaderboard based on the player's friends or local area rather than a global leaderboard.

4.3. Stages of Gamification

According to Zichermann (2011) a gamification designer should also think about what will bring the player back once he completes a task. Engagement loops start with a motivating emotion, any time there can be a social call to action where the user can invite other people into the game, continuing with player re-engagement, and always a reward or a visible progress at the end so that the user can continue his engagement with the activity.

We can simplify this to 3 stages: engagement, loyalty and commitment.

Engagement is the how the user starts paying attention to the product. This happens either by their inner motivation or using extrinsic motivation.

Loyalty is the stage where the user has a repeated interest in a certain product or behavior.

Finally, commitment is when the users choose a certain product over other products of the same type. Or in case of behaviors, the user becomes a delegate of the action to be taken. Taking the next step to invite others to also take the same action.

Figure 4-7. A social engagement loop, designed to maximize player engagement and reengagement using core product design.

Figure 15: Social Engagement Loop according to Gabe Zichermann (2011)

5. CONCLUSION AND FUTURE RESEARCH

As a conclusion, we can use gamification to improve engagement of players with any activity. Game mechanics and game thinking can be applied to any situation regardless of the context. The key point is to a successful gamification is to know our audience well and what motivates them. Using this information we can select the right game elements in order to design systems which are more fun, and engaging.

Some future research topics would be:

- how to apply gamification on marketing to increase the number of product users
- how to make advertisements more interesting using gamification

- how to prevent social TV watchers from switching to a different channel when the advertisement appears on screen
- how to increase the time people look at advertisements using gamification
- how can tracking and visualizing user information increase advertisement monetization
- how does gamification influence behavior in media consumption
- what are the proper design and development methodologies for the gamification of second screen applications

ANNOTATED BIBLIOGRAPHY

Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps

Gabe Zichermann's "Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps" is a very good starting point for the beginners who want to learn and apply game mechanics and dynamics to their projects. He explains almost every concept in gamification, puts them in a structural way, covering a lot of essential material. A lot of people think his book is too much focused on Advetising himself but he still simplifies the concepts for beginners

Reality Is Broken: Why Games Make Us Better and How They Can Change the World, Jane McGonigal, ISBN: 978-0143120612

Jane McGonigal compiles a lot of reading materials related to games and human psychology. She is trying to prove why we need gamification in our real lives and how it could motivate us to function better in our everyday tasks and change other behavior for beter. She introduces "FIXES" for the broken parts of the reality.

Game On: Energize Your Business with Social Media Games, Jon Radoff, ISBN: 978-0-470-93626-9

This book is mostly for marketers and product/game designers who want to create products which will keep the users in an engagement loop.

The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education, Karl M. Kapp, ISBN: 978-1-118-09634-5

This literature is more focused on education and the gamification of learning. If you are interested in how to make learning more fun, then read this book.

GLOSSARY

ARG

Alternate Reality Game is a game which integrates its mechanics and dynamics with real life and makes the users think that the background story of the game as if it was real.

FLOW

The flow is a state in which a person is concentrated and is neither bored nor frustrated but enjoying performing a specific activity.

FPS

First Person Shooter

LEADER-BOARD

A list and comparison of players high scores

MMOG

Massively Multiplayer Online Games

MUD

MUD (Multi User Dimension) is a multiplayer virtual world where players communicate to play the game using a text-based interface.

SIMULATION

An application that imitates a real life system

VIRAL MARKETING

A type of marketing which uses the self-replicating viral process of pre-existing social networks in order to spread the brand awareness.

VIRTUAL CURRENCY

A currency which only exists within an application.

VIRTUAL ECONOMY

An economic system consisting of virtual goods and virtual currency.

VIRTUAL GOOD

An item which can be bought and used (either by real cash or using virtual currency) only within a virtual environment.

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