Lappeenranta University of Technology
School of Business and Management
Degree Program in Computer Science

Ashkan Yaldaie

CONTINUOUS ASSESSMENT THROUGH GAMIFICATION IN THE FIELD OF EDUCATION

MASTER'S THESIS

Examiners: Adjunct professor (D.Sc.) Jouni Ikonen
D.Sc. Antti Knutas

Supervisor: Adjunct professor (D.Sc.) Jouni Ikonen

ABSTRACT

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This thesis investigates the impact of gamification on student motivation and learning. Gamification can affect peoples' behavior in different domains including the higher education. The use of game design techniques in education offers the potential to make learning more motivating and enjoyable for the students. However, the current thesis work finds some gaps in the field of research considering the use of gamification in education. The future of gamification in education depends on fixing these drawbacks. The thesis addresses some of the issues and proposes possible solutions. Furthermore, the possibility of continuous assessment through gamification is covered in the current thesis since the method can affect the students' motivation. Based on the results of a primary and a secondary research the thesis proposes a gamification system for education and possible directions for improving the proposed system.

ACKNOWLEDGEMENTS

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1 INTRODUCTION

Drawing a background on the games' popularity is required in order to cover the effectiveness and motivational aspects of gamification (Deterding, 2014). Video games are popular among all age groups (Sailer et al., 2017). The average age of gamers is 35 years old and the total customer spend on video games in 2016 was $30.4 billion in the United States. Sixty-five present of families have a member who plays video games three or more hours a week. Most of these gamers are playing with their friends and they argue that video games help them to have a social connection with the other players. (The Entertainment Software Association, 2017)

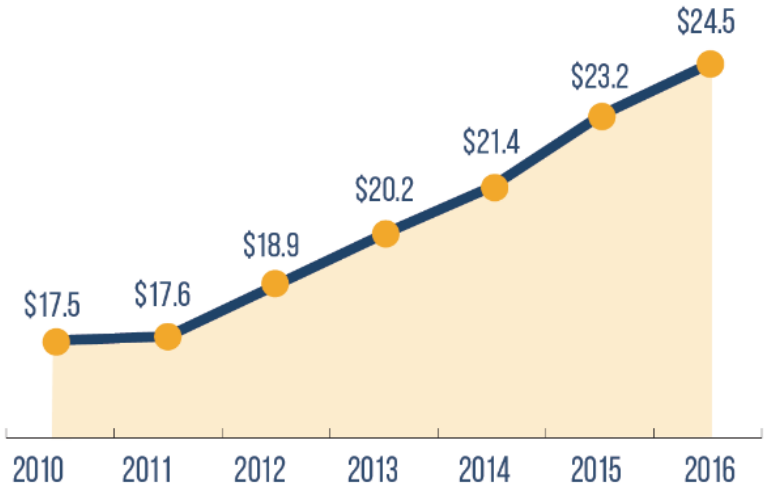

Figure 1: Annual spend on video games industry in the United States in billion (The Entertainment Software Association, 2017).

The gamers have real-life challenges to deal with like job, education, family, and other goals. However, they manage to devote their time to the game world. The point is that in the game world players may feel a sense of accomplishment, creativity, power, and being fully alive. The mentioned attributes along with other game mechanics may be missing from the real world and that is why games are motivating. (McGonigal, 2011, p2-3)

The game elements such as ranks and badges are used in the military. Moreover, digital games are part of the military training. (Klopfer, Osterweil and Salen, 2009) The computer manufacturers created games like Solitaire and Minesweeper to provide the users with the opportunity of practicing with a mouse and learn the skills such as click, double-click, and drag and drop; the mentioned skills could later be applied in the business applications (Kapp, Blair and Mesch, 2014, p63). The second chapter contains relevant subchapters that describes the reasons behind the games' addictiveness by analyzing the game elements and design principles.

In order to avoid the confusion regarding the terminology serious games, video games, and gamification are explained throughout this thesis work. Serious games are full-fledged games that sometimes do not represent fun since they may be utilized in a very serious concept like for educating a commercial airline pilot by simulating flight scenarios (Sillaots, 2015; Kim and Werbach, 2016). A video game is designed mainly for entertainment purposes and it involves interaction with a user interface to generate visual feedback linked to the player's actions in a digital environment (McGonigal, 2011, p3; Deterding, 2015). Gamification must not be confused with the above-mentioned terms. The common definition of gamification is the usage of game elements and game design techniques in non-game contexts. (Chen et al., 2015; Sanmugam et al., 2016; Werbach and Hunter, 2012, p26)

Gamification in general and its relation to the higher education is also covered in the literature review in order to find the utilized assessment methods and techniques. Adopting the game elements in the field of education cannot be overlooked since the main goal is to motivate and engage the students. There are successful examples of applying the game mechanics in education. Game mechanics refer to rules and design methods for interaction with a game. (Sillaots, 2015) The Multiplayer Classroom is one of the early examples. In his book, Dr. Lee Sheldon explained the possibility of transforming a classical learning experience into a game. (Sheldon, 2012, p3-6) The students start with the lowest grade and work their way up to the

highest by completing the course levels. Because of Dr. Lee's methods, the student attendance record improved and the average grade went up from 'average' to 'good'. (Barata et al., 2013)

The game elements and techniques can motivate the students. However, the same methods cannot be used for every course since the objectives and target behaviors are different. (Padilla-Zea et al., 2014) The current project's ultimate goal is to propose a gamified system based on a set of objectives and in order to do so a theoretical background is prepared through a literature review. The following subchapters discuss the planning, thesis objectives, and research questions in depth.

1.1 Planning

The current thesis project started by recognizing the interested domain, which was gamification. The next step was to narrow down the subject in order to develop a more targeted thesis work. Continuous Assessment through Gamification in the Field of Education was chosen as the field of research after consulting with the thesis advisor. Moreover, the writer took part in two online courses regarding gamification in order to widen his knowledge considering the mentioned subject. The research questions and the methodology were developed over several meetings with the thesis advisor.

A literature review was performed in order to create the theoretical background related to the thesis subject and the research questions. More details regarding the literature review can be found in chapter 2. A list of references and other utilized sources were presented to the advisor for approval at the initial stage. One of the project objectives is to propose a gamification tool for education. A set of targeted users and objectives for the proposed gamification system were collected through surveys and interviews.

The current thesis is the result of more than 780 hours of work. However, due to the limitations that are presented in chapter 5, the gamification system in question is not tested in a real-life

settings. This project can be recognized as a groundwork for developing a gamification tool for education in possible future developments.

1.2 Project scope, questions, and objectives

The current thesis targets higher education and in addition to the focus of the thesis that is on the planning and background research a proposal for a gamification tool for education is developed based on the theoretical findings and the requirements for the possible users which are the students and teachers of the Lappeenranta University of Technology. A complete working gamification tool is out of the scope of this project. The writer does not claim that the final proposal is applicable for every educational institution or university course. The thesis answers the following specific research questions:

1. How can gamification be utilized regarding the continuous assessment in the field of education?
    1.1. To what degree gamification has been used in relation to the continuous assessment in the field of education and what were the adopted game elements?
    1.2. What is the gamification impact on the students and their level of motivation?
2. How to implement yet another gamification tool for education?

The thesis project in question is aiming to explain the concept of gamification in detail to answer the thesis questions and propose a gamified system. Questionnaires were sent to the potential system users and administrators in order to satisfy their requirement. Furthermore, the main objective is to plan a system with the ability of continuous assessment in the field of education.

The gamification methods may differ depending on the system users, circumstances, target behaviors, objectives, and organizational culture (Khaleel et al., 2016; Padilla-Zea et al., 2014). The current thesis covers both the positive and the negative aspects of using game mechanics

in education. Up to the point, the research methods were discussed briefly. The next subchapter goes into details about the methodology of this thesis project.

1.3 Methodology

The thesis work divided into two major parts: the theoretical background, which is done through a literature review and the second part that was a proposal for a gamification tool in education. In order to complete the second part, questionnaires were sent to a randomly selected group of teachers and students of the Lappeenranta University of Technology. The questionnaires can be found in Appendices 1 and 2. In addition to the questionnaires, a number of semi-formal and semi-structured interviews were conducted to elaborate on the teachers' experience regarding continues assessment. The result of interviews' qualitative analysis is presented in chapter three.

2 ROOTS OF GAMIFICATION AND ITS TIES TO EDUCATION

This chapter presents the relevant background that is necessary to understand the concept of gamification and its relation to the education. After providing, the literature selection approach the chapter starts by explaining games in general before going into the details of gamification. It is important to understand why gamification works, cover both the positive and the negative sides of it, and find the difference between a game-based and a gamified system. The chapter covers all the previously mentioned subjects.

2.1 Literature selection approach

Considering the research questions, presented earlier, a literature review is performed in order to create the theoretical background related to the thesis subject. Furthermore, twelve books are selected to assist with the completion of the related work. Subchapter 2.5 presents the outcome of the preformed literature review.

Table 1: Selected books to complete the thesis work.

TITLE	DATE	WRITTEN BY
Gamify: how gamification motivates people to do extraordinary things	2014	Brian Burke
Drive : the surprising truth about what motivates us	2009	Daniel H. Pink
The Gamification of Learning and Instruction Fieldbook: Ideas Into Practice	2014	Karl M. Kapp, Lucas Blair, Rich Mesch
For the Win: How Game Thinking Can Revolutionize Your Business	2012	Dan Hunter, Kevin Werbach
The Gamification of Higher Education: Developing a Game-Based Business Strategy in a Disrupted Marketplace	2014	Neil B. Niman
Reality Is Broken: Why Games Make Us Better and How They Can Change the World	2011	Jane McGonigal
Gamification: Using Game Elements in Serious Contexts	2016	Stefan Stieglitz, Christoph Lattemann, Susanne Robra-Bissantz, Rüdiger Zarnekow, Tobias Brockmann
The Multiplayer Classroom: Designing Coursework as a Game	2011	Lee Sheldon
Formative Assessment, Learning Data Analytics and Gamification. In ICT Education	2016	Santi Caballé, Robert Clarisó
Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps	2011	Gabe Zichermann, Christopher Cunningham
Gamification in education and business	2015	Torsten Reiners, Lincoln C. Wood
Gaming innovations in higher education: Emerging Research and Opportunities	2017	Robert Costello

Four major scientific databases were searched through with the following keywords: (gamification, gamify, gamified) with (education) and (blended, face-to-face, online) with (teaching). The first search revealed a large number of results. Considering the research scope and in order to obtain more usable data, the search was applied to the title and the keywords of the publications rather than the full body. The final step was to examine the content of the papers and choose the relevant ones to the thesis objectives. Furthermore, the early papers, which explain the concepts in general terms, were excluded. Figure 2 shows the time span of the adopted scientific works.

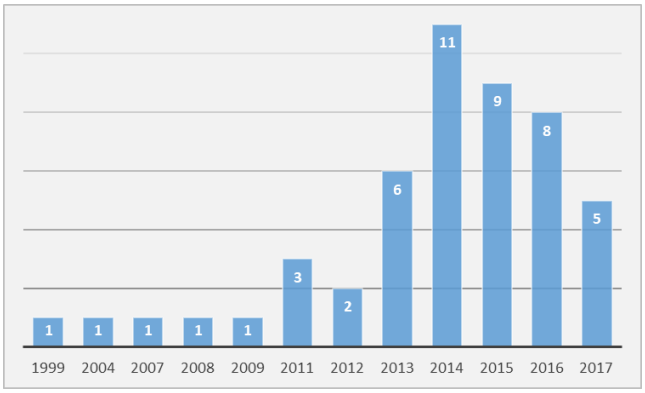

Figure 2: The time span of the used scientific works related to gamification in education and blended learning.

Out of the 49 papers, six are about the learning techniques and the rest are related to gamification in education. Table 2 shows the number of papers taken from each source. In addition to the scientific papers and the books, two studies are utilized, one of them is linked to the computer and video game industry completed by Entertainment Software Association and the other one is a Gartner study about the future of gamification.

Table 2: The number of papers taken from each source.

DATABASE	NUMBER OF RESULTS
IEEE Xplore	12
ScienceDirect	4
ACM Digital Library	11
ResearchGate	22
Total:	49

2.2 Games

It is necessary to explain the meaning of play and game in order to discuss gamification. The word “play” originated from Paidia that is Greek. Play and game represent a different set of activities. Play represents free form of actions that do not have standard rules and game on the other hands is a voluntary structured activity that is subjected to standards and rules. (Deterding et al., 2011) Games have defined goals and most of them have a win or lost state. The sense of accomplishment may be motivating for the gamers. (Huotari and Hamari, 2012)

Playing offers the following set of freedom: freedom to fail, experiment, freedom of identity, learning while playing, and freedom of allocated effort. One at play has a freedom to fail as many times as required in order to learn a new skill. The play does not have any initial goal. However, the goals unfold as the play proceeds. The player has the freedom to learn and to experiment with a wide range of activities while exploring different identities or even find his/her own identity in the real or the play world. The play may run from minutes up to hours

and the player can decide how much effort and time put into a play. (Klopfer, Osterweil and Salen, 2009)

There is freedom in games but within the boundaries of rules, goals, and the game structure; these attributes separate the game from the real word, the boundary is referred to as the magic circle by Johan Huizinga, a 20th century thinker. Thinking about the circle in a business or educational context means to create a world, which is interesting for the employees or the students. It will give them the opportunity to explore, complete the tasks, and learn from their mistakes to reach pre-defined goals that are set by having the business or educational objectives in mind. (Werbach and Hunter, 2012, p39) In addition to the rules, games also have a steady feedback system that helps the gamer to stay in the circle (Liu and Peng, 2013).

Games are breaking big challenges into smaller and more manageable chunks (Werbach and Hunter, 2012, p39). Yet, games are more challenging in comparison to the real world. In the real world, one can just throw a ball in a basket but a basketball player must follow all the rules of basketball to do the same thing and call it a score. Among other features, a basketball match is engaging and popular due to the game rules. (McGonigal, 2011, p22-23)

Gaming requires playfulness that means the willingness to play. The gamers are not just playing within the rules of the magic circle but pushing the boundary to test its limits. Playfulness needs the freedom to experiment and to fail. The learning takes place when the boundary is tested and the limitations are realized. (Lee and Hammer, 2011; Klopfer, Osterweil and Salen, 2009) Most of the video games give the user opportunity to learn from failure and change the difficulty level of the game. With the help of video games, effective and powerful education models can be designed in order to motivate the students. The rise of gaming consoles such as Wii and the PlayStation has shown that video games can reach the fans in different forms, which is very important to acknowledge in the educational gaming sector. (Llorens-Largo et al., 2016; Klopfer, Osterweil and Salen, 2009)

2.2.1 Why games are addictive

As seen in Figure 1, games are becoming more and more popular over the past years (The Entertainment Software Association, 2017). What is it about games that people all over the world choose to spend so much time in the game world? The games are satisfying many human needs that otherwise is difficult to fulfill in the real world (McGonigal, 2011, p4). Video games are created to entertain people and to achieve that objective they adopt artwork, animations, and storylines in order to generate an enjoyable experience for the gamer. The goal is to keep the players absorbed with the role that they have in the game. The feedback and the reward systems are designed to guide the player toward the desired objective. (Burke, 2014, p29)

Games and emotions are associated with each other in a powerful manner. Games provide many positive and negative emotional experiences, such as fear, surprise, disgust, and wonder. Games offer repeated experiment, which can also be explained as the repeated failure. In the game world, a failure is a path to success since players can try until they overcome the challenges. In the real world, however people have fewer opportunities to try and when they fail the stakes are high. The loss in games is necessary because it is the pathway to learning and ultimately to the mastery. (Lee and Hammer, 2011)

The player can adopt a desired identity in a game that in the real world cannot be achieved easily. A hero that saves the world, a farmer, pilot, solder, or a football player are just few examples of the vast amount of identities that games offer. In the simplest form, a nametag can be the player's identifier. Some games provide much more, such as a digital representation of the player that can be modified in every way and get mature over time. This can give the people the privilege to be the one who they want to be instead of who they really are. One might think that this is just a delusion and does not have any impact on the people's self-image. Research proves the opposite. Many people cannot separate the virtual world from the real life and start to think that the game identities, which they created, are real. In fact, most of the gamers are willing to pay real money in order to purchase virtual goods for their virtual self.

Since players devote so much to the virtual world, for them it becomes just as real as the real world, they live in. (Niman, 2014, p72-73; Lazzaro, 2004)

Games are fun and that is a reason why the gamers keep coming back for more (Langendahl, Cook and Mark-Herbert, 2016; Deterding, 2014). There are four general types of fun in association with a game. Hard fun taps into people's emotions through obstacles and challenges. Positive stress is the emotion linked to the hard fun since there is no fear of failure and overcoming the difficult tasks give pleasure to the gamers. Easy fun is not connected to succeeding or failing it is just casual enjoyment. Experimental fun puts the attention on the player exploring different personas and the game world rather than winning. Social fun is about interacting or even competing with the other players. Teamwork is increasingly becoming a part of video games and the players get to complete tasks as part of a larger group by defending and helping their team members to overcome the obstacles. A game designer can use one or more types of fun depending on the objectives. (Werbach and Hunter, 2012, p98-99; Lazzaro, 2004)

2.2.2 Game elements and design principles

There are many tools at the exposal of the game designers to make a game engaging. These tools are called game elements. Among other elements, games reward their players for their achievements with points, badges, and leaderboard ranks. This section is set to discuss some of the popular game elements in order to prepare the knowledge required for creating a game like environment. (Werbach and Hunter, 2012, p40) Points represent the player’s advancement throughout the game with numerical values, they are also a type of feedback. There are different forms of points such as experience points, power points, and reputation points. With enough experience points, the gamer can level up. Power points are gained by unlocking a new power in the game and reputation points show how much the game community trusts the player. (Sailer et al., 2017; Goshevski, Veljanoska and Hatziapostolou, 2017)

Gamers can get a badge for many reasons. For example, completing a level, achieving enough experience points, or unlocking a hidden feature in the game. Virtual goods like badges are important for the player reputation and people with particular badges can have influence on the other players in the social games. Badges have a positive impact on the gamer's motivation. (Ziesemer, Muller and Silveira, 2013) They can also serve as a goal and the user can go to the next level by earning a badge. Similar to the points, badges are also a form of feedback in the games. They can have influence on people's behavior. Players might select certain challenges and paths to get a badge. (Sailer et al., 2017)

The players can be listed on a scoreboard, based on their gained points or reputation in the game a scoreboard which also referred to as a leaderboard generates a sense of competition for the gamers. It can motivate them to progress and achieve more. (Sillaots, 2015) The players on the top of the scoreboard might feel better but at the same time, the stakes are high for them in order to keep their position (Hanus and Fox, 2015). Research has shown that the scoreboard can be demotivating if not used properly. Gamers with the lower position on the leaderboard may feel to be left out. They may think that they cannot compete with the best if the gap between the top and the bottom of the board is too big. (Laskowski, 2015)

In addition to the mentioned game elements, there are other game design principles. Creating a sense of curiosity is one of the effective ways, which can engage the players. Naturally, people are driven by curiosity. The game can have clear paths and goals and they may be revealed to the player at the beginning of the game. Yet, the game designer can leave it to the players to choose the path and explore the possibilities in the game-space without being afraid of failure since the freedom to fail is one of the possible features of a game. (Kapp, Blair and Mesch, 2014, p175; Fotaris et al., 2016)

Humans are social and in games, the social aspects can be offered to the player through a story. The game designer can give the player a purposeful role in a story. The gamer may feel a sense of relatedness if the story includes other teammates into it. A shared goal with the other players

in a meaningful story can evoke the people to continue playing a game because they feel responsible. (Sailer et al., 2017) Human beings have been communicating with the future generations through the stories and that shows the influence of the storylines in a game. A well-developed character in a good story, which players have a personal interest in and can sympathize with, may help them to reach the ultimate goal of the game willingly. (Kapp, Blair and Mesch, 2014, p172)

Challenges and games are typically correlated, as the game proceeds challenges are becoming more and more difficult which in return adds to the game's attractiveness (Deterding, 2015). Many games involve forms of competition that engage more than one player. Moreover, the competition in the video games may be against digital opponents that are powered by the game console's processor. (Langendahl, Cook and Mark-Herbert, 2016) Challenges in the real life may not be as encouraging as the challenges in games. In games, tasks and goals are carefully designed for the player's entertainment and pleasure. Games reward their players when they overcome an obstacle. That does not often happen in the real world. (McGonigal, 2011, p3)

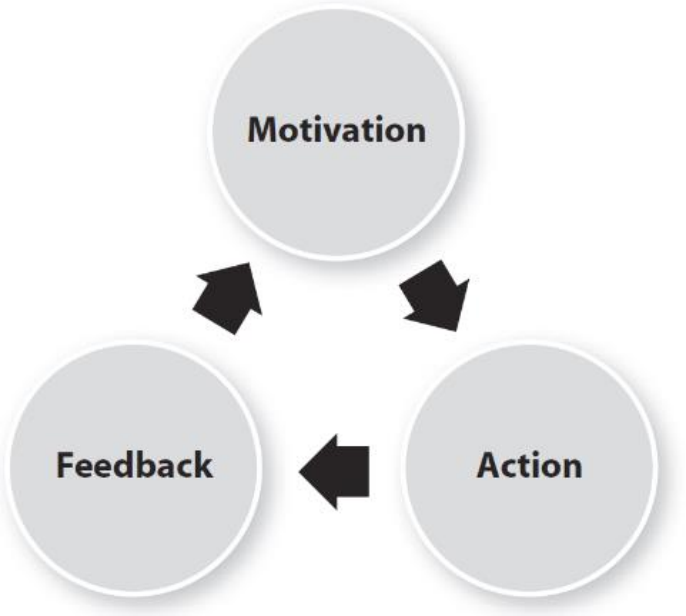

Figure 3: Feedback, motivation, and action (Werbach and Hunter, 2012, p96).

Feedback is a powerful tool to change people's behavior, motivate them, keep them in the desired path, and psychologically influence them. The activity cycle is shown in Figure 3. Drivers do not overspeed when they are given a feedback by showing their speed on a display on the side of the road. (Werbach and Hunter, 2012, p64; Attali, Y. and Arieli-Attali, 2014) Games provide rapid and automated feedback in order to provide pleasant experience (Sillaots, 2015). Regarding the games, feedback comes in many forms such as badges, points, progress bars, or even just an inspirational message. The time span between feedbacks in a well-designed game is not very long. (Stieglitz et al., 2016, p37; McGonigal, 2011, p21)

Most of the video games revolve around the player. It means the player is the center of the attention. Creating an interesting character in the games can help engaging the player. Research proves that having an avatar, which is a visual representation of a player's character, can be motivating since the player feels more accountable in a game when linked to a virtual figure. Some video games adopt two characters, one is a teacher that gives the guidelines and the other represents the gamer. (Kapp, Blair and Mesch, 2014, p178) Avatars are effective if, they reflect the audience's real character or if, they help them to adopt a new desired identity (Werbach and Hunter, 2012, p93; Sailer et al., 2017).

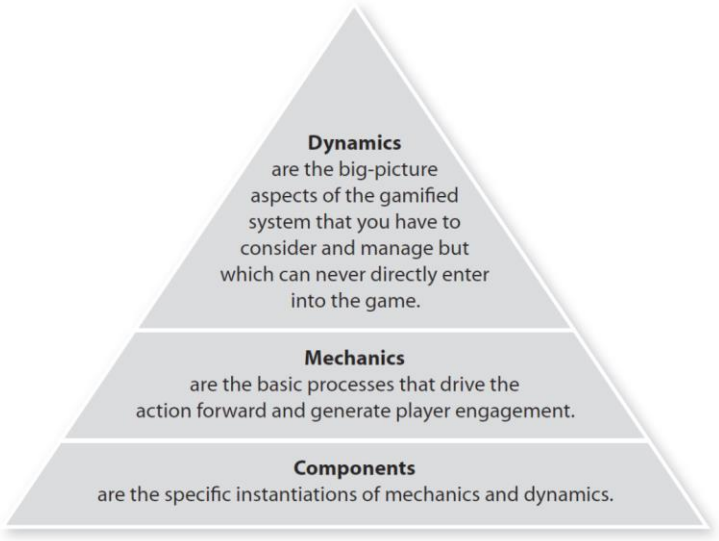

Figure 4: The game element hierarchy (Werbach and Hunter, 2012, p82).

Game elements can be classified into three levels: components, mechanics, and dynamics (Sillaots, 2015). The dynamics level is related to creating an emotional attachment to the game with the storyline, the player's growth through the game, and the relationship between the players. Among other elements, the mechanics level is mainly about feedbacks, competitions, rewards, and challenges. Components are the representatives of the player like badges, avatar, points, and achievements. There are many other elements, which can be linked to each level of the game element hierarchy. (Werbach and Hunter, 2012, p78-82) The game element hierarchy can be seen in Figure 4.

2.3 Gamification

Gamification is a complex term. Researchers explain the concept based on the situation and the environment. However, most of the explanations have a set of accepted characteristics. Gamification can be recognized as the use of game strategies in a non-game context in order to change user's behavior. It can be also defined as utilizing game techniques, methods, and strategies in order to make a non-game environment more attractive and create a strong bond with the users. (Llorens-Largo et al., 2016) Gamification can also be referred to as a process of enhancing a service by adding gameful experiences in order to create overall value for the users (Huotari and Hamari, 2012).

McGonigal calls the term gamefulness, which is the result of applying game strategies and elements to produce enjoyable user experience (Botha, Herselman and Ford, 2014). An enjoyable user experience can be created through intrinsic and extrinsic motivation, which drives people to perform tasks. Intrinsic motivation is related to tasks that are entertaining and people complete them because they want to. Extrinsic motivation is linked to rewards and puzzles. People perform these tasks because they gain a price upon completion. Extrinsic and intrinsic motivation are used in gamification to keep people focused on tasks. (Ziesemer, Muller and Silveira, 2013)

According to Gartner, the purpose of gamification is to change behavior in the targeted users in order to complete business objectives. The game elements such as points, challenges, scoreboards, and rules are set to create a game like environment, which can be enjoyable for the audience since naturally, people are hard-wired to the game like activities. Finally, gamification is also explained as the use of game thinking in a non-game environment for the sake of problem solving. (Llorens-Largo et al., 2016)

Based on the previously given explanation in this section, the common definition for gamification is the usage of game elements and game design techniques in non-game contexts (Chen et al., 2015; Sanmugam et al., 2016; Werbach and Hunter, 2012, p26). The current thesis defines the following terms in order to understand the presented explanation: game elements, game-design techniques, and non-game contexts. Gamification is not about creating a complete game. As explained in the previous section game elements are like tools that a designer uses to create a game. The same tools may be utilized in a gamified system. (Werbach and Hunter, 2012, p26-27)

The tools are there to make a task more enjoyable to complete. However, gamification is not just about the game elements. If not used properly through meaningful game-design techniques points, badges, and scoreboards can demotivate the audience. The user may think that there is no point to collect the virtual goods. A design technique, which can be a back-story for a gamified system, may motivate and provide a purposeful environment for the user. Non-game contexts refer to situations, which involve real-world business, educational, or social goals. The main objectives must not be forgotten while developing a gamified system and the users should not care more about the badges or points rather than the main purpose of the system. (Werbach and Hunter, 2012, p27-30)

Figure 5: Cow Clicker (Werbach and Hunter, 2012, p105).

Ian Bogost created a social game called Cow Clicker. Figure 5 shows a screenshot of the game. The player could click on a cow's picture endlessly to get a form of virtual cash called "mooney". Moreover, the player could buy points and upgrade the cow by paying real money. The developer himself got surprised when many people were carried out with their cow clicking for no purpose other than accumulating virtual points. The activity seems to be pointless but addictive. The example shows the power of game elements but on the other hand, it is a bad example of gamification. (Kim and Werbach, 2016)

2.3.1 The rise of gamification

A young video game designer established Conundra, a consulting firm that combined the game elements with the business strategies in 2003. This was the first use of gamification in the current sense. The firm was not very successful but it proved that the game design principles could be used in a business context. (Werbach and Hunter, 2012, p25) In 2008, Bret Terrill first used the term "gamification" in a blog post. The focus was to change people's behavior and increase engagement by applying the game elements in web properties and non-game environment. (Botha, Herselman and Ford, 2014; Dicheva et al., 2015)

Daniel H. Pink's book published in 2009. The book starts by explaining what is called "Motivation 1.0" that is related to human survival and the basic needs. During the industrial revolution "Motivation 2.0" is introduced, which means acquiring external rewards and punishments to inspire certain behavior. Extrinsic motivation or "Motivation 2.0" alone does not satisfy the needs of a complex society where people had to learn skills that are more complicated. Services like Wikipedia and Firefox are evolving through the people's voluntary involvement. People take part in such activities due to the intrinsic motivation and this is what Pink refers to as "Motivation 3.0". He recommends offering the employees more flexibility like distant work. Although Pink does not use the word gamification. However, his work could be recognized as a groundwork for the term. (Pink, 2009, p 18-62)

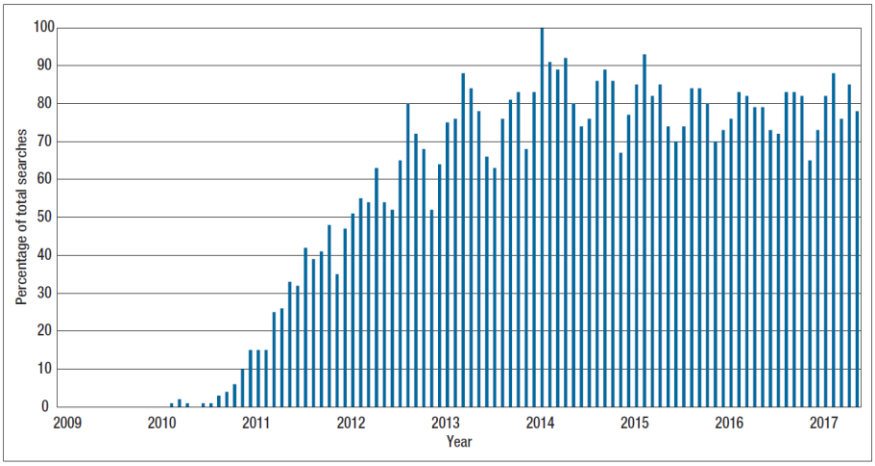

Figure 6: Google's trend data for gamification (Basten, 2017).

The term gamification is adopted wildly since 2010. Jesse Schell spoke at the DICE summit about the usage of game techniques in the daily tasks. (Sheldon, 2012, p5; Dicheva et al., 2014) In 2011, Gartner predicted that 50% of the companies that dealt with innovations would gamify their processes by 2015 (Arnold, 2014). A 2012 research found that just 29% of workers are engaged in their tasks. Moreover, 52% are considered unengaged and 19% completely disengaged. Gamification has the potential to solve such problems in various areas including business. (Burke, 2012) Oxford Dictionaries selected the word "gamification" as a runner-up for the word of 2011 (Burke, 2014, p13). Since Gartner's prediction in 2011, Gamification has

seen a massive rise in popularity (Dicheva et al., 2015). Google's trend data for gamification up until 2017 is shown in Figure 6.

2.3.2 The difference between gamification and serious games

In addition to gamification, there are other ways of using games for purposes other than entertainment. This section of the theses is set to explain the difference between the concept of gamification and serious games. Serious games are directly on the opposite side of gamification as seen in Figure 7. Serious games are full-fledged games that sometimes are not even fun to participate in since they may be utilized in a very serious concept like for the military training or educating a commercial airline pilot by simulating flight scenarios (Sillaots, 2015; Kim and Werbach, 2016).

Gamification differentiates from the other related concepts by two dimensions. One can call a service or product gamified if the game elements are utilized partially but in a meaningful way and a gamified system still fulfills its productive and operational tasks. The game elements are there to motivate the users and not to transform the service or product into a complete game. (Stieglitz et al., 2016, p6-7)

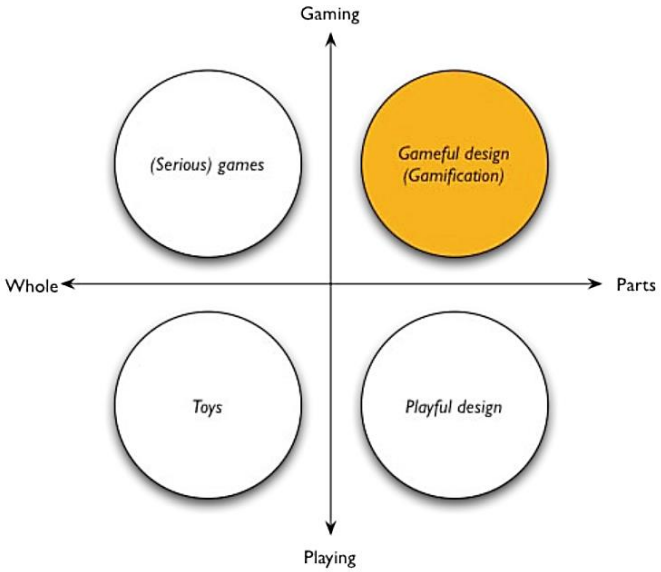

Figure 7: Differences in game design (Deterding et al., 2011).

World Without Oil, in short WWO, is an example of a serious game that is created for social benefits. It is an alternate reality game, which means the player does not play a character or an avatar. In the game, the players represent themselves and talk about their real-life experiences as if the fiction of the game is true. The players of the WWO go to work, shopping, school, and do the other tasks by adding a voluntary obstacle, which is the lack of oil. For example, instead of going to work by a car they walk or go by bicycle. The point is to share the experience with the other players in order to modify behavior and learn something new while motivated by the positive stress. (McGonigal, 2011, p311)

2.3.3 Behaviorism in gamification

Burrhus Frederic Skinner also known as B. F. Skinner demonstrated the power of rewards in directing behavior. Skinner rejects the concept of freedom and links the human behavior with extrinsic rewards. However, later research shows that such rewards, in the long run, may be counterproductive and result to demotivation. Having that in mind, a short-term or focused gamification can be viewed as a means of shaping actions. One can assume that it is not possible for the gamification providers to manipulate users. If designed for the wrong purposes, gamification can even harm the participants through manipulation. (Attali, Y. and Arieli-Attali, 2014; Kim and Werbach, 2016)

An example of misused gamification system comes from the Disneyland's hotels in Anaheim. The performance of housekeeping staff was measured and displayed on a scoreboard. The gamified system negatively influenced the staff, so they labeled it as the electronic whip. Seeing their performance rank against the others caused fear and anxiety. It is reported that some workers did not even take a bathroom break in order to keep or improve their ranks. (Kim and Werbach, 2016; Stieglitz et al., 2016, p72; Deterding, 2014)

Deloitte Leadership Academy provides business training for company executives and business schools worldwide. They employed game techniques that can be defined as a positive use of

gamification. Deloitte could not get its users to devote time and engage with the platform content for diverse learning preferences. They utilized three types of game principles rewards, missions, and leaderboards in order to change user behavior and encourage engagement. Executives could see their points in a web platform and stay in the path of the course by completing the missions. The scoreboard presented the user with their current rank and expertise level on different topics. As a result, 46.6% of the people returned to the website daily and 36.3% returned to complete the tasks weekly. It was expected that on average each user graduate within 12 months before adopting the gamified system. However, this milestone was achieved within six months after utilizing the new gamification platform. (Basten, 2017; Kapp, Blair and Mesch, 2014, p48-49) As seen in the resent example gamification has the potential of changing human behavior in the field of education. Of course, positive changes are mainly desired while developing such systems. However, a 2017 research shows that on average only 26% of the gamified systems for university level education managed to positively change the student behavior. Figure 8 shows the complete results. (Dichev and Dicheva, 2017)

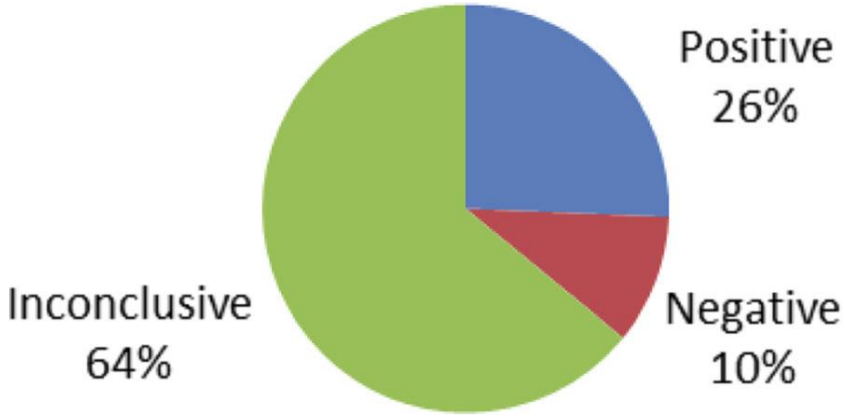

Figure 8: Effectiveness of behavioral studies by evidence (Dichev and Dicheva, 2017).

Researchers discovered that it is possible to effect social behavior through games and gamification. In one example, they have asked people to participate in a game where they play a superhero character who flies around a virtual city and helps the people. It is observed that people who played the game are more likely and quicker to help the real people in the real

world. Other similar research proved that similar approach could influence human behavior positively. (Kapp, Blair and Mesch, 2014, p49-51)

In general, people respond to similar stimulations to change their behavior. In order to affect user's old habits to new ones, the following common steps could be applied:

- Set goals
- Implement triggers
- Take small steps
- Find common goals for the users
- Attract support from friends
- Build the complexity, gradually
- Repeat until new habits are build
- Add new features to Keep the experience fresh

It is better for a gamification system to have short-term and long-term goals. The final target may be losing weight and a short-term goal can be to lose one kilogram per week. The user should be reminded to take actions through meaningful triggers. Like doing 10 pushups every hour in order to reach the desired weight. The gamification system may be more effective if many people with the same aim use it and support each other. The system developer must not forget that the new habits are built gradually by repeating the actions and keeping the users excited with new built features in the system over time. (Burke, 2014, p48-50; Langendahl, Cook and Mark-Herbert, 2016; Dichev and Dicheva, 2017; Wiesenberg and Stacey, 2012)

2.3.4 Motivation through gamification

Motivation comes from the Latin world motivus, which means serving to move. A person who is moved to do something is motivated. (Werbach and Hunter, 2012, p53) Beside the behaviorism that mainly focuses on extrinsic rewards, there are other ways to motivate people. Gamification's foundation is based on the Self-Determination Theory, for short SDT, which is about the intrinsic motivation. (Kim and Werbach, 2016) SDT identifies three drivers for intrinsic motivation: Autonomy refers to willingness when doing a task in another word,

freedom of choice. Competence is about mastery and challenge that in return would encourage the user to engage deeper in an activity. Relatedness represents the need for social relations between participants, which can raise the sense of responsibility in the people. (Goshevski, Veljanoska and Hatziapostolou, 2017; Deterding, 2015)

Gamification relies on the motivational aspects of games to embrace a variety of behaviors such as saving electricity, quitting smoking, or saving money. The question is how to design intrinsic motivation in order to achieve a goal. (Barata et al., 2013) Using staircase is a good exercise, but many people choose the more comfortable way, which is traveling between the floors by elevator or escalator. The Piano Staircase could be seen as an example of intrinsic motivation. A Swedish subway turned the staircase into an electronic piano, with each step representing a key that made a piano like sound and as the result, 66% of the people were more likely to avoid the escalator in order to climb the stairs. The Swedish subway did not offer any extrinsic rewards. The passengers just did it because it was fun to play the audible sounds while using the stairs. (Werbach and Hunter, 2012, p36-37; Langendahl, Cook and Mark-Herbert, 2016)

Figure 9: The Piano Staircase (Werbach and Hunter, 2012, p37).

The founders of Twitter, Evan Williams, and Biz Stone are also responsible for a service called Lift. The service allowed the users to find common interest and form groups. At the initial stage,

the designers added game elements such as points and badges to motivate the audience. However, they quickly realized that these elements are just complicating the experience and creating a range of unnecessarily programming problems. Lift discarded these game elements and instead adopted other game mechanics like a simple feedback loop, which showed the user's activity over the past weeks. The new approach was more successful and Lift is continuing on this path. (Werbach and Hunter, 2012, p101-102)

The last example of this section is a service called the Weight Watchers that is created based on the game principles. The user can set goals for reducing weight and in order to help the user through the path good food choices are suggested. The user also can attend the group meetings and get points based on the weight loss. The group meeting allows the people to share their stories and compete with each other. Comparing to a successful game Weight Watchers is about the meaningful progress and the outcome is just a milestone to reach. Players can self-assess and find activities and challenges, which are more suitable for them instead of being forced to exercise or eat healthy. (Niman, 2014, p104)

2.3.5 Why gamification works

Many reasons influence gamification's popularity. By 2016, many companies including Khan Academy, Treehouse, Udemy, and Duolingo have connected to their audience through gamification. (Fotaris et al., 2016) Gamification invokes the same experience as games do regardless of the outcome. In other words, without developing a complete video game but taking advantage of their experience. (Llorens-Largo et al., 2016) This section of the thesis work discusses some of the attributes linked to the gamification's positive reputation.

The user feels a sense of achievement while working with a gamified system. Duolingo is a language-learning system. The user starts with zero experience points and as the student advances, a visual counter keeps track of the achievements. Furthermore, a virtual character encourages the learner to continue and reach the maximum points per each day. Students can set their desired activity level. This gives the user a sense of control over the learning process.

Duolingo also unlocks a variety of badges for the players based on their achievements and activities. (Simionescu and Martin, 2016)

People like to set goals and compete. With Nike+, users can track their running progress in an online service. It gives them the opportunity to receive real-time stimulation from friends and challenging each other to improve the running experience. Getting real-time feedback makes a big difference for the Nike+ players since the feedback reminds them to run faster and further each time they slow down. The service also gives rewards to its users and they can level up by earning enough points. (McGonigal, 2011, p157-159; Çeker and Özdamlı, 2017)

Most of the games have what is called a win state. It is a way of demonstrating success and not necessarily a complete victory. The win state can happen after completing a level successfully or in the case of gamification, completing an activity effectively, can represent a win state. (Klopfer, Osterweil and Salen, 2009) People like winning and that could be one of the reasons for gamification's popularity (Werbach and Hunter, 2012, p90). Khan Academy is an online service, which allows the students to learn several topics including computer-programming languages by watching tutorials and completing exercises. The user is rewarded with virtual goods after completing each lesson or an entire course. This can be compared to winning in video games. (Barata et al., 2013)

As stated earlier rewards may have positive effects on people. There are many ways to use game principles in order to encourage certain behavior, which can be intrinsically motivating. LiveOps is a call-center outsourcing provider that has managed to use gamification as a way to improve motivation. It allows the employees to make and answer calls from home as a part-time job through a virtual platform. LiveOps gives the unemployed chance of employment while learning online skills. Call-center work can be boring but the LiveOps agents describe their experience in a passionate way. (Kim and Werbach, 2016)

Figure 10: LiveOps user profile (Werbach and Hunter, 2012, p64).

LiveOps has a workforce of about 20,000 and it focuses on giving positive experiences to the agents by adding simple game elements including scoreboards and points. Rather than competing with each other, the agents put their effort into learning and developing new skills. The virtual rewards must have been effective since the customer satisfaction increased and the service level of LiveOps has improved by 10 %. (Werbach and Hunter, 2012, p63-64)

Teamwork and being helpful for the organization in order to reach a common goal is one of the ways that gamification adopts for the users engagement. The Microsoft Language Quality is a successful example of using the game mechanics in a large organization. The point of the game was to review the Windows 7 dialog boxes in different languages in order to find the possible translation errors. The game designers made sure of the users' accuracy by including deliberate errors into the dialog boxes. The Microsoft employees could freely join in the experience since it was not considered as a part of their daily job and the aim was to play it in the free time. (Kim and Werbach, 2016)

Microsoft Language Quality was sent to Microsoft offices all around the world for the Windows localization. The progress was shown to the participants by awarding them with points for every translation error they could find. Two different scoreboards were utilized to show the ranks: an individual and a regional one. The Microsoft employees wanted their region to win

and finally, the office in Japan managed to rank the highest by finding the most of the errors in the dialog boxes. (Werbach and Hunter, 2012, p18-21)

Four thousand and five hundred people all around the world participated in the Language Quality and reviewed more than five hundred thousand dialog boxes and a large number of participants described the experience as enjoyable. Microsoft Language Quality worked because the employees had the freedom to participate in it to help their organization develop the best possible product. Gamification, in this case, made the experience more engaging by presenting the rank of each region and raising the sense of competition between the teams. Microsoft Language Quality was a success and it proved that introducing game elements to complete a rather boring task is useful and motivating for the participants. (Kim and Werbach, 2016)

Figure 11: Screenshot of the Microsoft Language Quality (Werbach and Hunter, 2012, p19).

Curiosity is a powerful sense and gamification can raise it through adopting a back-story that is meaningful and can evoke voluntary engagement (Sailer et al., 2017). Many companies use PowerPoint slides or lengthy documents in order to train their employees. Usually, people hate this experience and do not learn much with the above techniques. Bottom-Line Performance

is a learning design company that found the solution to the mentioned problem through gamification. They have developed a platform for training that is called the Knowledge Guru. (Kapp, Blair and Mesch, 2014, p212)

Knowledge Guru as a product is designed to eliminate the following issues with the training programs in the firms:

- Too much information at once was given to the employees.
- Reading the lengthy material or listening to a PowerPoint presentation is not fun.
- The employee did not feel the sense of accomplishment. The learners do not know how much they actually learned.
- The firms do not have a way to access the employee's knowledge.

Bottom-Line Performance adopted many game elements in order to achieve its goals. The storyline is about a guru living on a mountaintop, there are three paths to reach there, and each path contains a set of questions. The players get immediate feedback regarding their answers. In case of incorrect answers, the users receive correct information and can try again. An actual game unlocks at the top of the mountain upon mastering the Knowledge Guru status. The result of adopting gamification techniques was immediate. The learners were actually eager to train in the Knowledge Guru platform and Bottom-Line Performance built the quickest sales pipeline for this product. (Kapp, Blair and Mesch, 2014, p212-217)

Figure 12: Screenshot of the Knowledge Guru (Kapp, Blair and Mesch, 2014, p216).

In general, there are two categories of gamification: structural gamification and Content gamification. The structural gamification does not alter the content and makes the structure around the content game like. The point is to engage the learners with rewards and motivate them with the elements like the progress bar. For example, a student can gain points for watching a video. The video itself does not have any game mechanics. The most common elements linked to this category would be points, badges, achievements, and levels. Content gamification, on the other hand, gamifies the content itself but it does not turn it into a game. For example, a university course can start with a challenge instead of a set of objectives. (Kapp, Blair and Mesch, 2014, p65-67) In order to make a gamified system effective and engaging, a careful planning and analysis of the real objectives is necessarily (Caponetto, Earp and Ott, 2014). The provided examples in this section are the result of extended planning and careful design.

Microsoft game-testing lab is more like a psychological research institute. The game designers are focusing on how a game can be as entertaining as possible for the players. (McGonigal, 2011, p38) Based on the Self-Determination Theory the game elements can satisfy psychological needs of a gamified system's user. The need for autonomy can be linked with avatars and meaningful stories. The need for competence can be satisfied with points, badges, scoreboards, and progress bars. Shared goals and having a teammate can be connected to the social relatedness. One can say that gamification works because of its psychological influence on the population. (Sailer et al., 2017)

2.3.6 The challenge of gamification

One of the basic challenges of gamification is how to use the game principals in a way that motivates the users. Scoreboards are one of the elements, which are deemed to be demotivating for the audience. However, many gamification systems have managed to utilize scoreboards appropriately. For example, leaderboards can be anonymous or instead of making the entire board visible, players can see their position in the middle of the board with 10 names

above and 10 names below. By adopting this approach, the users with the lower rank visualize that they are not alone at the bottom of the leaderboard and less likely to lose motivation. (Goshevski, Veljanoska and Hatziapostolou, 2017)

Points, badges, and leaderboards are closely associated with gamification (Dichev and Dicheva, 2017). However, relying too heavily on rewards can make the players less interested in the objectives and more focused on the rewards (Nicholson, 2013). The game elements like badges and points must have a real meaning for the participants. Users often are burnt out if offered pointless and endless rewards. Many people may look at a gamified system and think why they should care about these badges and points. (Werbach and Hunter, 2012, p28)

The same rules that apply to a real economy can be utilized for a gamified system. The rewards are of value for the users comparing to the money in the real world. A game or gamified application developer determines the money supply. The rewards lose their value if the player can obtain them too easily and very complex rules for achieving a virtual badge can result to demotivation. Transparency is one of the aims of gamification. Players are usually aware of the rewards they can expect and any changes to the system economy have its own consequences. It is not required to be an economist in order to manage a gamification system. However, a developer must be aware of the negative or positive effects of any changes in the system. (Burke, 2014, p98-99)

Even successful gamification designs might get into trouble. The earlier given example of the Piano Staircase has proved its effectiveness. However, some usability issues got uncovered when analyzed further. The result of the experiment was a disturbing noise during the rush hours and when several people were trying to walk on the stairs at the same time. There is no information about the duration of this experiment or even if the Piano Staircase was installed permanently. (Laskowski, 2015)

The inventor of Cow Clicker, Ian Bogost, argued that gamification is a marketing hoax and can be used against the user's interest. The Cow Clicker demonstrates the power of gamification and at the same time proves Ian's point. He recommends replacing the word gamification with "exploitationware" which means "villainous reign of abuse" since according to him it will explain the practice more realistically. (Abdullah et al., 2016) Bogost notes the example of airlines reward program for frequent travelers. He argues that as soon as too many people get the rewards the airline will change its rules and make it harder for the customers to win a free travel. This does not seem to be fair to the customers. (McGonigal, 2011, p151)

The designers should be aware of the dangers of gamification. They must understand their responsibility. It can be assumed that gamification providers do not attempt to harm their audience. However, according to a Foreign Policy article, some groups are using the game mechanics on their websites to recruit supporters in order to harm people. Such groups adopt the path to mastery that is a game principle and as the new members advance, the system gives them access to real exclusives and sensitive information. The members get more points for more creative and radical techniques. (Kim and Werbach, 2016)

There are no shortcuts while developing a gamification system. Some people may think that adding points and badges to an already existing experience is enough to motivate the population. Gamification is a working process, which requires an understanding of the goals and the target users. In 2011, Google introduced a new service called Google News Badges. The users could earn badges based on the news articles they read. They could receive a higher-level badge if they read more articles on their favorite subject. Google designed more than 500 badges in order to cover a variety of news topics. The users could even share their badges on the social network to show what kind of news they read. The project was unsuccessful right from the start. The audience was unclear about receiving an award for an activity they do anyway. The system was not aligned with the user's motivation and meaningful goals. Just more than a year later Google decided to discontinue the service. (Burke, 2014, p99) Figure 13 shows the possible steps and required research for developing a gamified system.

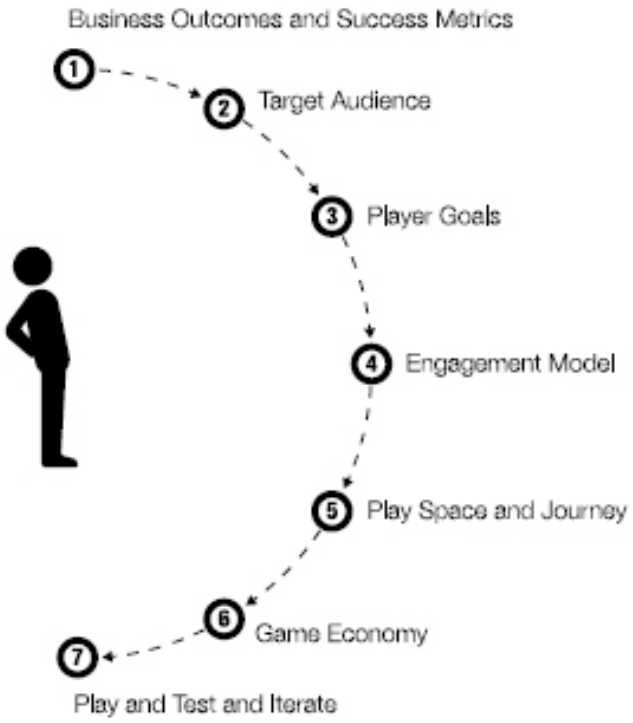

Figure 13: Gamification design process (Burke, 2014, p74).

Adding extra work to the existing processes must be avoided in a gamified system's design. The developers often make the mistake of creating a gamified solution on the top of the existing activities. Gamification must support the operations instead of being implemented as a separate solution. As stated in the previous paragraph targeting the correct audience is essential in the development of a gamified system. An extended research is required in order to find out about the users, their goals, and activities. It has been observed that the development team create a gamified system that is suitable for themselves rather than attracting the targeted audience. (Burke, 2014, p102-103)

In a computer-hacker contest, participants were supposed to hack several servers in a row and each server had stricter security than the previous one. While all the hackers were busy with the given task, one of the participants took a shortcut and hacked the server that was keeping the scores and as the result, he won the contest. One can say that the hacker's actions are

considered to be cheating but his thinking out of the box was aligned with the test objectives and goals so he was announced to be the winner. As explained earlier the players always test the limitations of the magic circle. While using a gamified system for education there are always people who are interested in winning more than learning. It is not the designer's job to change the natural tendency of some people to cheat. The goal is to minimize the impact of cheating or align it with the objectives of the system like in the given example. It is essential for a developer to test and retest the gamified solution during its lifetime since the learners are always looking for additional ways to cheat. (Kapp, Blair and Mesch, 2014, p137)

Except for the moral and technical challenges, a designer may encounter legal issues. There is no gamification law for the developers to refer to and design a gamified system accordingly. Furthermore, the law is different in almost every part of the world. If a gamified system is a part of an organization, the labor laws may apply. For example, the employees may be entitled to ask for a salary while using the gamified system in their free time. Privacy laws apply if the user is identifiable in the system and handling the user information is a task, which should not be taken lightly. A service agreement is a digital contract between the operator and users. This can be a right action to consider while developing a gamification tool. (Werbach and Hunter, 2012, p108-109; Kim and Werbach, 2016)

Virtual goods like badges may be subjected to the copyright laws. The badges must be selected carefully since they might resemble a design similar to another artwork. They also should not be directly copied unless the original creator authorizes it. The developers must undergo the protection procedure of their own work. It might be a good idea to fill a patent application in order to keep the rights of an innovation. Hiring a lawyer can be very helpful while dealing with such a sensitive subjects. (Werbach and Hunter, 2012, p108-110; Reiners and Wood, 2015, p543-544)

Second Life allows the user to build a virtual world containing virtual assets like buildings, cars, and virtual pets. The users often spend real money in order to purchase these virtual goods.

The players may not have a goal or set of objectives by living in the virtual world. For some, it is a form of play that is also called digital dollhouses. Changing the value of the virtual currency might be problematic since the users have financial ties to the game. Such issues must also be reviewed while developing a gamified system. The service agreement content has to consider this issue. (Werbach and Hunter, 2012, p111; Klopfer, Osterweil and Salen, 2009)

Luck, randomness, and risk-taking are considered as game mechanics (Sillaots, 2015). Yet, the same game principles might be confused with gambling that is illegal in parts of the world. If a gamification solution offers puzzles with a monetary value, it could be considered as a lottery system depending on the design. Nevertheless, as long as the badges and other rewards are of no actual value and are solely for motivational purposes the gambling laws do not apply. Such rules usually can be ignored if the rewards are a form of service to a regular user, for example, a free traveling offer for a frequent airline customer. (Werbach and Hunter, 2012, p111)

A gamified solution can be considered as a fraud if it financially benefits from user activities in the platform without the participant's knowledge. The rule is that gamification must not deceive its audience. The users must be aware, if the providers are promoting a product through gamification since people should not be made to do something against their will or interest. For example, it is not correct if a gamified system directs the bank customers to choose a service with a higher interest rate to present them with nothing more than a virtual badge. (Werbach and Hunter, 2012, p112; Reiners and Wood, 2015, p548-549) Having explained the roots of gamification in detail, the next subchapter is set to cover the possibility of utilizing the game elements and techniques in the field of education.

2.4 Gamification in the field of education

The educational system offers real rewards in the type of grades and degrees to the students. The game elements are already a part of traditional education. Yet, the students are usually engaged with different types of games on their smart-phones or PCs and studying is the last thing they want to do. The problem can be due to the teaching material, the learning style, or

unclear benefits of education for the students. The educational system is focused on the outcome. Learning must be seen as a process with the goal of creating a happy and successful life for the learners and the outcome can be seen as a secondary objective. (Niman, 2014, p1)

Over the past years, the educational system has adopted technologies like MOOC short for Massively Open Online Course, which delivers the learning content to the student without limitations. However, it is not clear if the educational system just uses such tools to reduce costs or there is a real meaningful research behind it in order to benefit the students. (Niman, 2014, p2-3) Moodle is the other tool that came to the rescue of the education system. A learning management system pursues the goal to digitalize a course. Moodle is a form of a computer-based assessment system that can generate different types of assignments like multiple-choice questions, short-answer questions, and true-or-false questions. (Caballe and Clarisó, 2016, p10) Absorbing technology in education did not have the same effects as games have on the people. A game like the World of Warcraft has managed to create intrinsic motivation for the players. Gamification has the potential to motivate and solve the students' disengagement issues in the educational system. (Mohd Zaid, Sanmugam and Abdullah, 2014) The current chapter is set to examine the attempts of gamification in the learning by looking and analyzing the real-life examples. The goal is to discover the effect of gamification on students' motivation.

Gamification in education does not mean a complete shift from the traditional face-to-face classes into online or virtual courses (Szeto, 2014). The technology and the web platform can be simply adopted in order to assist the teaching process. Moreover, it is observed that online teaching makes the students more self-directed and independent but on the other hand, the students who were subjected to the classical face-to-face lectures were more successful in tests and exams. Overall, 92% of all online education studies since 2015 have found that distance and online education is at least as effective as the classical education. Using the online tools for education results in a more systematic experience. (Stacey and Wiesenberg, 2007; Nguyen, 2015) A Study in Canada and Australia showed that both online and classical teaching

approaches have positive and negative effects on the students. Furthermore, various cultures can react contrastingly to the different methods of teaching. The recommended approach depending on the objectives and the target behaviors could be a hybrid or blended method, which uses both the online and the traditional way of teaching. (Stacey and Wiesenberg, 2008)

The multiplayer classroom is mentioned in the introductory part of this thesis work. Lee Sheldon has described in his book that it is possible to gamify a conventional learning without relying heavily on the technology. (Barata et al., 2013) Sheldon's experiment utilized many elements from the multiplayer online games including:

- Through point systems, the students could participate in different tasks to earn points.
- To engage with course material, the students were exposed to solo and team challenges.
- The students were in direct competition individually or in groups.
- The entire class had to work together accomplishing a challenge. This can be compared to a boss fight in games.

Sheldon has divided the lessons into 12 levels and the students could earn experience points upon completing a level as shown in Table 3. (Sheldon, 2012)

Table 3: The grading system for Sheldon's course (Sheldon, 2012, p28).

Level Eight	1600	B-
Level Seven	1540	C+
Level Six	1460	C
Level Five	1400	C-
Level Four	1340	D+
Level Three	1260	D
Level Two	1200	D-
Level One	0	F

The grading system presented in Table 3 has a problem, which can be picked up swiftly by a game designer. The difference between level one and level two is 1200 points. Yet, it takes just 60 points to get from the level two to the level three. Sheldon was aware of the problem however, he decided to go ahead with the mentioned grading system. In his book, Sheldon

explains that changing the traditional terms for education into more game-like terms can affect the students' engagement level. For example, the student name can be replaced with an avatar name; the teacher can be referred to as the game master; taking a quiz can be called defeating a monster. (Sheldon, 2012, p31-32) The final exam was called the final boss to defeat in Dr. Lee's course. The students were taking the exam individually but the grade could affect the entire group. If all the team members were doing well in the test, they were entitled to gain what was called the teamwork bonus. (Sheldon, 2012, p117) The students were offered bonus points for helping each other with a challenging task that can be explained as social networking in the games. (Sheldon, 2012, p263) As explained in the introduction, Dr. Lee's gamification methods resulted in more activity during the course and higher grades in the final exam. (Barata et al., 2013)

To test the gamification effect on the student, a course called Multimedia Content Production was gamified, the first attempt was between the years 2010 to 2011. The learners were awarded points for completing the course activities. The students were graded from one to five and every 900 points corresponded to a progress level. For example, a student with 1800 points had a grade 2 for the course. The course participants had access to a web-based leaderboard as shown in Figure 14. (Barata et al., 2013)

Figure 14: The Multimedia Content Production course leaderboard (Barata et al., 2013).

The second attempt for gamifying the same course was for the academic year of 2011-2012 and some changes were done based on the students' feedback. The number of the points per level changed from 900 to 1200 and some additional points for activities were added to the experiment. The adopted methods and game elements for this example did not have any effect on the students' attendance in the lectures comparing to the same non-gamified course. However, those who participated in the lectures were more active. The gamified courses had a positive effect on the learner's final grade. Most of the students managed to reach the top grade and the researchers observed the highest minimum grade ever. The students considered the course to be more motivating and productive and on the other hand more challenging and time-consuming since they had to work with online forums in addition to their tasks. Moreover, most of the students suggested applying the gamification methods to the other courses. (Barata et al., 2013)

Another study is related to gamifying two courses for three years. A bachelor course called Computer Organization and a master's level course with the title of the Cloud Computing. The participants were 450 over the studies lifetime. The researchers were following the MDA framework for gamification. MDA stands for mechanics, dynamics, and aesthetics. (Iosup and Epema, 2014) The framework analyses the game elements and their effects on the players in order to find the proper ones for gamification in different fields like education or business. Mechanics or the game elements result in the meaningful response from the audience. Points, badges, and levels are the examples of the game mechanics. Dynamics are about the player's interaction with the mentioned game elements. The interaction is analyzed in order to determine what a player is doing in response to the game elements individually or as a part of a group. Aesthetics are the outcome of the mechanics and the dynamics. It is about the player's emotions and feelings while interacting with the game elements. (Zichermann and Cunningham, 2011, p35-36) The researchers for this experiment have adopted seven game-elements: points, levels, leaderboards, badges, tutorial, social engagement loops, and unlocking content. The students were able to gain points by completing the courses' activities. In order to pass the courses with the highest grade, 10,000 points were required. The entire

content of the courses was divided into smaller chunks and the learners could unlock an activity by acquiring a certain number of points. The researchers do not explain how the game elements were utilized in details. Yet, the effect of gamification was 60–70% of lecture attendance up to the end of the courses. Seventy-five present of the total participants completed the gamified courses comparing to the 65% for the traditional courses. Over 90% of the students felt more motivated during the gamified courses and they commented that the new approach was more enjoyable and engaging. The experiment proved the importance of computer-based tools to keep track of the students' progress and the researchers realized that gamifying a learning experience is a time-consuming task and needs preparation. (Iosup and Epema, 2014)

The fourth example of gamification comes from a one-month course with the goal of promoting entrepreneurship among ICT engineering students. The goals were to raise the students' motivation in order to find new business opportunities, learn how to manage a startup, and supporting various levels of students since the course population included B.Sc., M.Sc., and Ph.D. level students. The course consisted of various types of activities: lectures, home assignments, competition and ranking on a leaderboard, group work, and talks by invited entrepreneurs. The participants were also asked to play a game called SimVenture that is a business simulation as a part of their learning process. The course had clear goals and feedback loops in order to keep the players engaged. However, at the initial stage, the course had a drop rate of 20 students out of 54. The students also had difficulty working with the business analysis tools due to the complex simulation environment. Yet, the researchers claim that the experiment was successful in terms of reaching its goals due to the students' positive feedbacks. (Bellotti et al., 2013)

Gamification in general and specially gamification in education must be well planned. Designing a system in order to motivate and engage the students is an iterative process. It is recommended to start from small and over time gain the experience in order to build a meaningful gamified system. (Werbach and Hunter, 2012, p102) It is easy to build a reward-based system. The developer can simply target the desired behavior and assign rewards to it.

However, a reward-based gamification is more suitable for immediate and short-term change. As long as the rewards are supplied, the desired behavior continues. The target behaviors can stop as soon as the rewards are not given anymore. Reward-based gamification works well if the system is set to teaching a skill. Changing one's behavior requires a more meaningful approach and design techniques. Extrinsic rewards can demotivate a learner who has intrinsic motivation for the activity. (Reiners and Wood, 2015, p1-19) Figure 15 shows the distribution of the game elements in gamifying the higher education from June 2010 until June 2015.

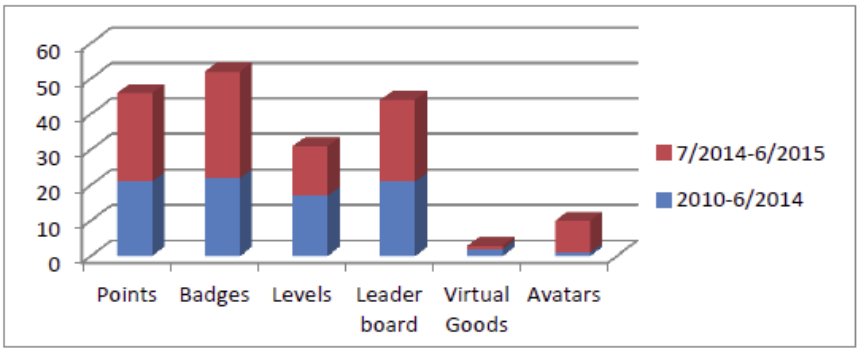

Figure 15: Distribution of the game elements in gamifying the higher education (Dichev and Dicheva, 2015).

The educational system is responsible for harming the students through the traditional grading systems. The students are not willing to participate in a learning activity unless a grade is assigned to it. Referring to the Figure 15 reward-based gamification is continuing the same approach, which means harming the students further. A meaningful gamification for education can have the following characteristics.

- Giving the freedom to the learner to experiment and fail within the system boundaries.
- Attaching an interesting story for the course activities and give the users the opportunity to make their own stories.
- Put the power in the hands of the participants.
- Provide real and meaningful information to the students.
- Encourage the students to learn from each other and other real-world experts.
- It is useful if the learners share and use their experience in the gamified system.

It is important to see the gamification system as a temporary layer that can be removed so the users can continue with the authentic real-world settings. Going back to the most common definition for the term gamification, which is the application of the game elements in the real-world context a developer, must focus on the user's engagement with the real-world context and not with the gamified system. (Reiners and Wood, 2015, p1-19)

Gamification is more than the addition of points, badges, and leaderboards. It is about turning a loss into success the goal is not as important as the progress of the learner. People do not like to be told what to do. The teacher is there to assist the student through the educational journey and the student's freedom of choice should not be limited drastically. Social media was more successful in engaging the students over the past years comparing to the educational system. While using the social media people are free to tell their stories and share their experiences. A service like Facebook provides the freedom to tell stories and collaborate on a verity of subjects. The educational system can learn from the social media experience in order to improve its methods. Learning for the students must become a way to establish an identity, which they desire and is close to their lives. (Niman, 2014, p127-133)

2.4.1 Assessment

The current assessment system in higher education does not work very well (Reiners and Wood, 2015, p214; Padilla-Zea et al., 2014). Assessment strategies are about what should be assessed and what should be marked: individual or group performance (Moccozet et al., 2013). There is no single standard to measure one's performance other than a grade, which usually does not send a clear signal regarding the student's work. It is very difficult for students to build self-esteem because of the current ways of assessment and comparisons with the other learners. Accomplishment in a well-designed game, on the other hand, is a meaningful way of building strong identity and self-esteem for the players and as a result, they devote more time and energy playing the game in order to create an even stronger self-image in the game environment. The educational system was not able to link the students' results with their

individual identities. Universities must focus on finding ways to create process achievements that can be directly connected to the development of the individuals. (Niman, 2014, p33-34)

Developing a game-based assessment may be a way of creating a meaningful learner's identity for the students (Simionescu and Martin, 2016). A game-based assessment can be set to three categories: game scores that measure the accuracy of the player, external criteria such as time to complete a task, and embedded assessment that is related to activities linked to the path of success. The goal of assessment is not learning. However, a correct method of assessment can advance the learning experience. Students get better if assessed continuously with the help of the game elements. Moreover, continues assessment reduces the feeling of uncertainty for the participants. People like to be assessed and the need for social comparisons explains the popularity of badges, points, and leaderboards in a gamified system as shown in Figure 15. (Reiners and Wood, 2015, p209-2011; Niman, 2014, p93)

Assessment through a storyline is one of the powerful ways to engage the learners. In a gamification attempt for advancing programming skills. Students were instructed to help a virtual robot called Gidget in order to clean chemical spill at a factory and as the robot advanced, it is gradually damaged and the students could fix it by completing a computer programming code. The students were given automated positive and negative feedback for their code. As seen in this example the assessment is embedded into the story and the methods kept the students engaged and re-engaged in a task in order to complete the story. It is observed by the researchers that the students were satisfied with their performance and results while completing a programming course. It is also important to mention that they were no badges and points employed in this experiment. The players were just helping a game character in a fun way while learning new skills. (Mohd Zaid, Sanmugam and Abdullah, 2014)

2.4.2 Gamification and the engagement loops

As shown in Figure 3 an engagement loop is the result of giving feedback for the students' action in order to motivate them to take further actions. The students can see their progress

level clearly if the educator provides them with feedbacks. In addition, they are given a chance to take corrective actions regarding their performance when required. Creating an engaging experience does not end with providing feedback. The student's journey in a gamified system is equally important, the learning environment gets boarding if the experience is the same throughout the entire course. It is important to create a feeling of progress and accomplishment for the audience. (Werbach and Hunter, 2012, p95) It is not necessary to give positive feedback to motivate the system users. A meaningful negative feedback can also be effective as explained in the Gidget robot example from the previous section. (Mohd Zaid, Sanmugam and Abdullah, 2014)

It is helpful to look at the social media in order to create a successful engagement loop in a gamified education experience. Twitter, for example, has developed an entirely different engagement system for a new user in comparison to an experienced user. Twiter's novice users sign up in order to express their emotions and connect to the others. New users engage and re-engage with the system through what is known as @mention and as a result, they gain followers and further motivation to express themselves. The number of followers and the ranking system in Twiter, on the other hand, motivates the experienced users. When users' tweets are retweeted, they may feel a social responsibility to elaborate or take further actions. A new user may not even know what a retweet is. As explained in the previous paragraph, a Twiter user feels progress while engaging with the system. (Zichermann and Cunningham, 2011, p68-69)

The general form of a feedback loop in education is the following: the educator informs the students about their performance and ways to improve. The students also should be able to give feedback to the teacher in order to build a two-way relationship and as a result, a formative assessment is more meaningful when continues feedback was given during the course. The teacher also modifies and improves the teaching methods by considering the students' recommendations. Frequent and targeted feedback is necessary to create an engagement loop,

which is a way to improve the educational system for both the teachers and the students. (Langendahl, Cook and Mark-Herbert, 2016)

2.4.3 Group Work

Group work has been an important part of education for many years. However, assessment of a group work remains an issue. Group work may encourage the students to collaborate and learn from each other. Yet, awarding all the members with the same score might seems unfair to many, if considering their level of participation and engagement in the group work. (Johnson and Johnson, 1999) Teamwork may suffer from what is also known as the free rider problem. A free rider is a member of the group that does not take part in the team activities and at the end will be graded with the same score as the other active team members. One of the most used group-assessment techniques is the peer assessment, which increases the feeling of fairness and encourages the students to participate actively in the group assignments. Peer assessment has its own drawbacks although it is widely used in the educational system. The technique can have a negative impact on the students' relationship with each other. A combination of individual and group assessment can also be utilized in which a goal will be set for the entire group and in addition to the quality of the final group work the member's individual performance toward the final goal will be assessed. Beside the mentioned assessment techniques, the universities may use a variety of different group assessment methods to evaluate their students. (Moccozet et al., 2013)

Goals are important parts of the design in relation to the teamwork. Clear rules and the quality of goals have a direct effect on the students' motivation. (Johnson and Johnson, 1999) Regarding a complex task, the team members may be more prone to reach the mastery level in competition with the other teams. However, clear goals alone cannot grantee the success of a gamified system. Meaningful feedback and progress monitoring are equally important. A student's individual goals may have a negative effect on the collective goals and in order to avoid this, the instructor must properly define the collective goals and tasks. (Reiners and Wood, 2015, p513-516)

In an attempt to address the free rider issue, a gamified system for education is started to be developed since 2010 for a first-year bachelor course in Information Systems. The students were first prepared with the relevant information regarding the adopted social collaboration tools and peer assessment techniques. The participants' collaboration with the team were rewarded with points and a leaderboard was showing the ranks publicly. For example, a certain number of points were given to the student who published an article related to the subject in the social platform. Furthermore, the team members who read and commented on the publication could receive extra points. The quality of the material was not important at this point since the system's objective was to encourage the students to participate in the teamwork. At the end of the semester, a combination of individual and group work was used to grade the students. The grading seemed to be fair since the members of the same group did not receive the same grade because their participation level rank in the leaderboard was not the same. Figure 16 defines a hierarchy of participation actions in social platforms, which can be used for evaluating the level of individual activities in a team. (Moccozet et al., 2013)

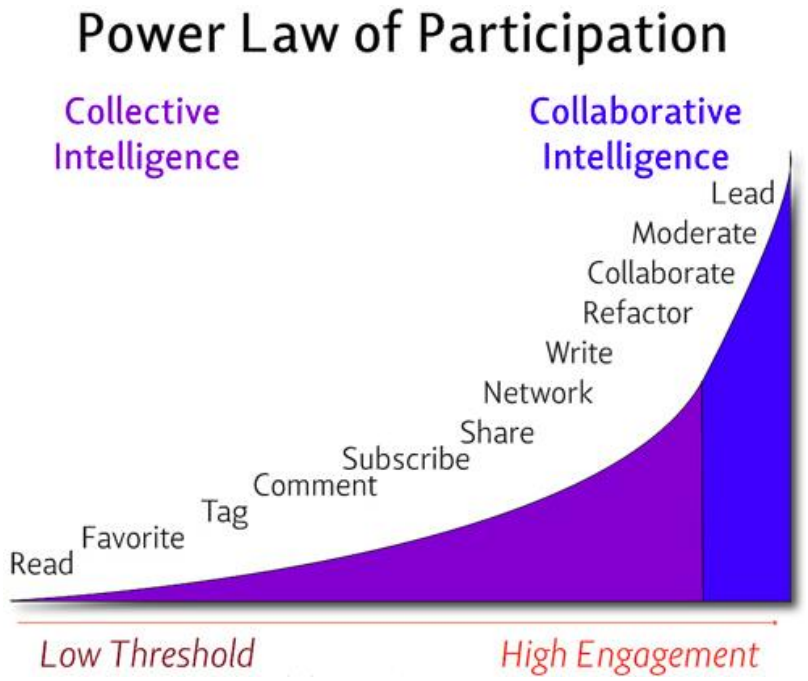

Figure 16: Power law of participation by Ross Mayfield (Moccozet et al., 2013).

2.4.4 A framework for gamification

The current section is set to familiarize the reader with two of the gamification frameworks. Moreover, some elements from the frameworks are utilized in chapter 4 that is related to proposing a gamification tool for education. Professor Kevin Werbach and Dan Hunter have proposed one of the gamification frameworks, which can be related to the topic of this thesis work. The framework includes six elements that will be discussed briefly.

1. Business objectives
2. Target behavior
3. Players
4. Activity loops
5. Fun
6. Appropriate tools

It is important to define the objectives while creating a gamified system. Is the objective to have an active class, to improve the learning process, or just encourage more students to participate in the lectures? The virtual goods (badges, virtual currency, points) are only valuable if applied in the right place for the right propose. It is crucial to remember that at this stage the system is in its entirety important, not what a player can accomplish by using it. After recognizing the objectives, the developers must focus on the target behaviors. What are the expectations of the system users? This is not about the system anymore but it is about the users. For example, a business objective may be to improve the learning process but the target user behavior can be for the students to read more articles and papers on the lecture topics. While creating the list of target behaviors the developer must be as specific as possible. There must also be a method of measuring the outcome. How can the product owner see the success of the gamification methods related to changing the users' behavior and in which way these behaviors can help the entire system to achieve its business objectives? (Werbach and Hunter, 2012, p86-91)

Who are the players? Is the gamification system for the professors or for the students, what are gender, demographics, and age group of the players? People play games due to the

different reasons. There are people who want to achieve, explore, socialize, or affect the other players. A gamification system designer must also consider the relation of the players to the system. Are they part of the system or just the system users? A gamification system must not offend its users. The design of badges, avatars, gamification methods, and reward are very important considering the user's culture, religion, and other beliefs. The fourth element is the feedback or activity loops. They can collect data for the purpose of assessment. Furthermore, the system can offer feedback to the players to encourage further action. The gamification system design should answer two important questions regarding the activity loops. How the system gets the new players engaged, and how it will continue to be interesting for the more experienced users. For example, people's comments and likes on user's uploaded picture in Facebook may stimulate the user to upload more pictures and more pictures, on the other hand, stimulate people to leave more comments or likes. (Werbach and Hunter, 2012, p91-97)

The nature of gamification is to motivate people and that is why the concept of fun must not be forgotten since it is one of the aspects, which can motivate. Different types of rewards are important but the storyline or the design of the system must motivate people even without adding any rewards. The players come back to use the system if they enjoy the design. The last element of the framework is to find the appropriate tools for gamification. After identifying the users and the system objectives, the designer must choose the right platform for the gamified system. Is it a mobile application, a website, or a personal computer application? The tools must be comfortable and easy to use for the players and the system administrators. (Werbach and Hunter, 2012, p98-101)

(Echeverría et al., 2011) developed another framework, which has two dimensions: the ludic dimension that covers the game elements capable of creating a desired educational experience. The framework divides all the game elements into four categories: mechanics, story, aesthetics, and technology. The mechanics are set to help the users reach the goals of a gamified system, the story unfolds as the game proceeds, aesthetics are the graphics, and sound effects of a design, and technology defines the input devices and utilized technology,

which make participating in a gamified system possible. The second dimension is the educational dimension that is divided into two parts: Learning objectives is related to the goals of a system and a set of activities, which help the student to reach the goals. Bloom's revised taxonomy is the utilized tool to classify the learning objectives. The framework must clarify the knowledge that the student should require by using the system and what the audience should remember, apply, and/or analyze. The second part of the educational dimension is the pedagogical model and supporting technology. There are many pedagogical models and the developer must utilize the one in line with the system objectives. For example, a monitoring tool for the educator could be useful if the objective is the students' active participation in the course. (Echeverría et al., 2011)

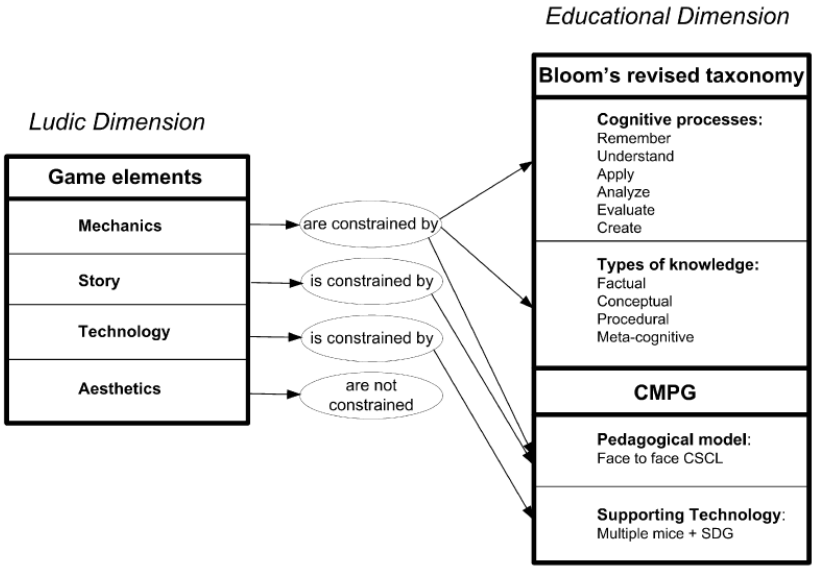

Figure 17: The two dimensions of the proposed gamification design framework (Echeverría et al., 2011).

Figure 17 is useful in order to visualize the two dimensions of the proposed framework by (Echeverría et al., 2011). CMPG stands for classroom multiplayer presential games, which describes a combination of a pedagogical model and its supporting technology in order for the participants to interact collaboratively with the virtual world. CSCL stands for computer-supported collaborative learning and SDG is single display groupware that means a single

computer shared by a group of students through a single display. The result of applying the framework in a real educational course increased in the average number of correct answers by the participants from 6.11 to 10.00 that is described as generally satisfactory results for the experiment. (Echeverría et al., 2011)

2.5 The results of the literature review

Gamification is directly linked to the continues assessment, adopting the game elements such as progress bars, levels, points, badges, and feedback can improve learners' experience by demonstrating them their progress level (Simionescu and Martin, 2016). Assessment is also possible through a storyline, the example of the virtual robot called Gidget is a successful attempt, which resulted to the improvement of the students' performance (Mohd Zaid, Sanmugam and Abdullah, 2014).

The engagement loops are also a form of assessment and the advantage is that the students can take corrective actions regarding their performance with the help of the provided feedback. The design of an engagement loop must encourage the learners to take actions based on the given feedback and this results to motivation and further actions. (Werbach and Hunter, 2012, p96) Continuous assessment and gamification has a positive effect on student performance and behavior (Dichev and Dicheva, 2017). Furthermore, the given examples of gamification in education in this chapter, like the Multiplayer classroom had a direct positive effect on the students' motivation (Barata et al., 2013).

Gamification has the potential to motivate and solve the students' disengagement issues in the educational system (Mohd Zaid, Sanmugam and Abdullah, 2014). The game elements and techniques can motivate the students. However, the same methods cannot be used for every course since the objectives and target behaviors are different. (Padilla-Zea et al., 2014) Reward-based gamification works well if the system is set to teaching a skill. Yet, a reward-based system is not recommended if the objective is to change one's behavior. The target behaviors can be discontinued as soon as the rewards are not given anymore. Changing one's behavior requires

a more meaningful approach and design techniques. Extrinsic rewards such as points and badges can demotivate a learner who has intrinsic motivation for the activity. (Reiners and Wood, 2015, p1-19)

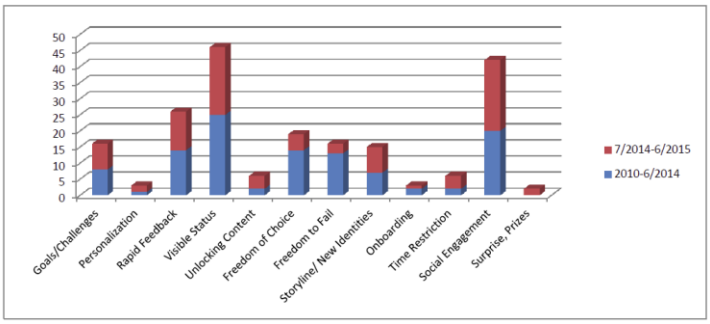

Figure 18: Gamification Design Principles distribution in gamifying the higher education (Dichev and Dicheva, 2015).

Figure eight shows that on average only 26% of the gamified systems for university-level education managed to positively change the student behavior (Dichev and Dicheva, 2017) and the reasons become clear by looking at Figure 15 and 18. Research proves that having an avatar, which is a visual representation of a player's character, can be motivating since the player feels more accountable in a game when linked to a virtual figure. Some video games adopt two characters, one is a teacher that gives the guidelines and the other represents the gamer. (Kapp, Blair and Mesch, 2014, p178) However, according to the Figure 15, it is one of the least used game elements in a gamified system for education. Figure 18 shows that the design principles such as surprise rewards, freedom of choice, onboarding, and a storyline that can be linked to the intrinsic motivation are not used in the most of the gamified systems for the higher education. Services like Wikipedia and Firefox are evolving through the people's voluntary involvement. People take part in such activities due to the intrinsic motivation (Pink, 2009, p 18-62). A gamification tool or system must be developed based on a clear set of objectives and target behaviors. A generic tool for gamifying a university course may not be as effective as a tailored one since courses have different methods of teaching, objectives, and participants. (Padilla-Zea et al., 2014)

2.5.1 Effective gamification for education

This chapter has presented several examples of gamification in the field of education. The following table is set to present the mentioned examples next to each other and recognize their visible effects on the students' motivation. This section's content is utilized in chapter 4, which is presenting a gamification system for education.

Table 4: Visible effects of the gamification methods on the students' motivation.

The course name	Game elements/principle	Objectives	Visible impacts	Reference
The multiplayer classroom	Points, challenges, levels, avatar, game terminology, and teamwork	Motivating the students to be more active during a course	more activity during the course and higher grades in the final exam	Sheldon, 2012
Multimedia Content Production	Points, levels, and leaderboard	Testing the gamification effect on the student	No effects on the students' attendance, more activity during the course, and higher grades, complains due to the multiple tools	Barata et al., 2013
Computer Organization/Cloud Computing	Points, levels, leaderboards, badges, tutorial, social engagement loops, and unlocking content	The students' response to the game elements individually or as a part of a group	More lecture attendance, more participants completed the gamified courses, and student motivation	Iosup and Epema, 2014
Entrepreneurship for ICT engineering students	Leaderboard, clear goals, feedback loops	To raise the students' motivation	Drop rate of 20 students out of 54, difficulty working with the complex tools, and positive student feedback	Bellotti et al., 2013
Advancing programming skills	Automated feedback, and story	Learning programming skills	Students' satisfaction with their performance, and learning the programming skills	Mohd Zaid, Sanmugam and Abdullah, 2014
Information Systems	Clear rules, points, feedback, and leaderboard	Addressing the free rider issue	Fair grading	Moccozet et al., 2013

3 OUTCOME OF THE CONDUCTED SURVEYS AND INTERVIEWS

As mentioned in the introductory part, questionnaires were sent by email to a randomly selected group of teachers and students of the LUT that stands for Lappeenranta University of Technology. The surveys were conducted in order to measure the importance of continues assessment for both the teachers and the students. Moreover, the teachers were asked to give a feedback on the provided assessment tools by the LUT. The complete set of questions can be found in appendices 1 and 2. The survey answers provided meaningful information linked to the proposal of a gamification tool or system, which is covered in the next chapter. The questionnaires were sent to 120 students and 30 teachers out of which 32 students and 8 teachers responded to the request. The surveys' ultimate goal was to collect the participants' understanding and constructive ideas regarding the continuous assessment at the LUT.

3.1 Survey for the students

Eighty-five percent of the survey participants were in their 20s who are first or second year students working towards a master's degree. Based on the survey results the students are familiar about the importance of continues assessment in education and get motivated if the method is used. The students were asked: does continuous assessment for your performance during the courses motivate you? Among of the answers were the following:

- As a person, I would like to receive feedback to know if I am on the right track, or not.
- I think it would motivate but currently it is not done in many courses.
- Knowing the mistakes help me to learn more.
- Continuous assessment helps me a lot to study better.

Figure 19 presents the students' responds to the same question in numerical values. One means they do not get motivated enough by the continuous assessment and five means continuous assessment helps them to get motivated the most.

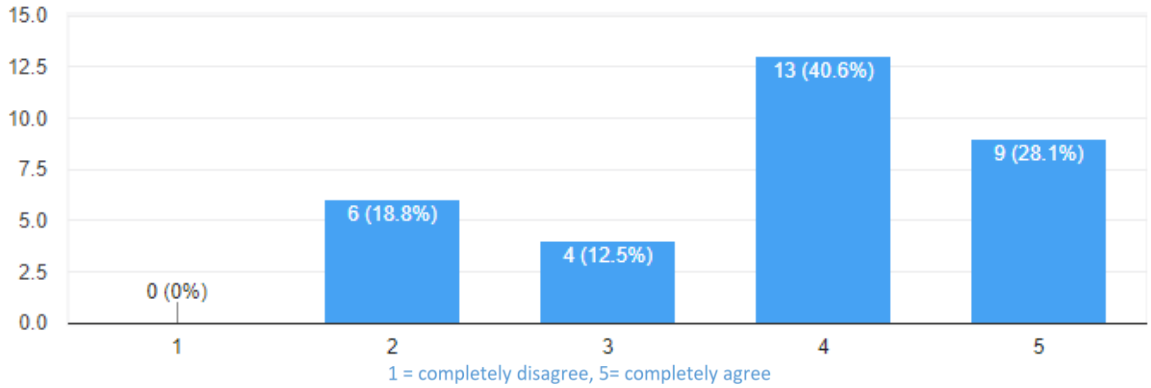

Figure 19: Does continuous assessment for your performance during the courses motivate you?

The survey participants are mostly happy with their final grades at the LUT. Comparing the results of the two survey questions can clarify the claim. The first question asks if the students' get enough continuous feedback for their performance during the courses at LUT? Figure 20 is set to present the students' responds. The students' responds are shown in numerical value from one to five. One means they do not get enough feedback and five means they are happy with the amount of feedback they get during a course. The second question asks if the students consider their final grades to be fair at the LUT. Figure 21 presents the responds to this question in the same numerical value as in the Figure 20.

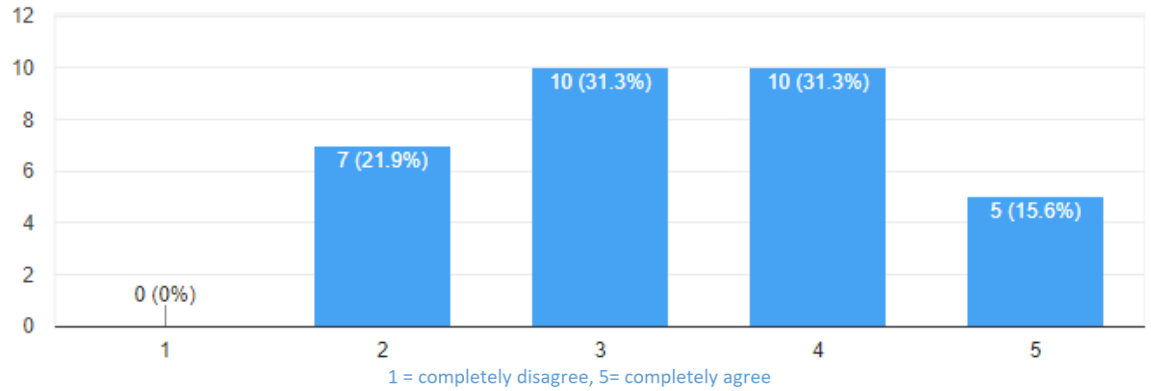

Figure 20: Do you get enough continuous feedback for your performance during the courses at LUT?

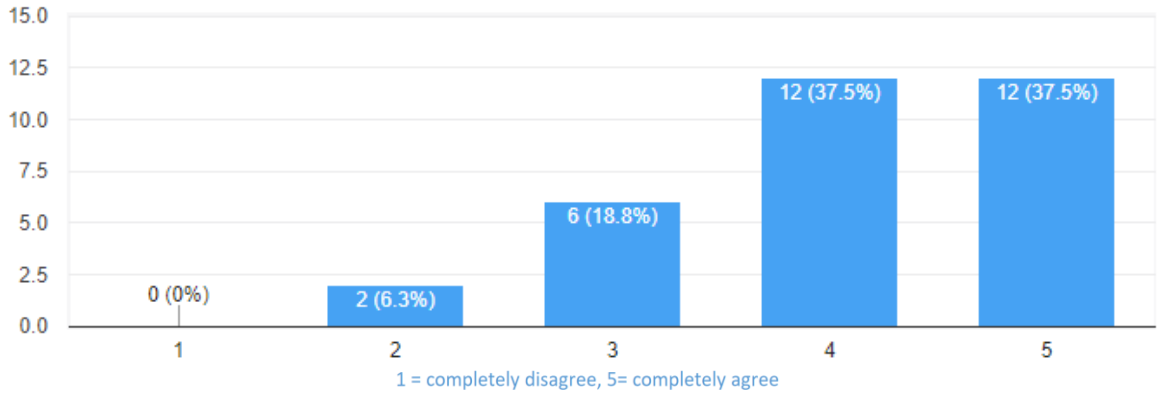

Figure 21: Do you consider your final grades at LUT to be fair?

Continuous feedback and the fairness of the final grade are linked to each other for the survey participants in a way that those students who think that they get enough feedback during a course are happier with their final grade. However, Figure 20 shows that the method of giving continuous feedback to the students still has room for improvement. Among the students' answers to the Figure 20's question were the following:

- Mostly we just get a grade on the test and assignments but no feedback. Would like to know why I got the grade and what I could have done better.
- The amount of feedback is sufficient but it is not constructive enough.
- Most of the feedback received during the courses has been strictly numerical without any elaboration.
- Mostly we just get a grade on the test and assignments but no feedback other than that.

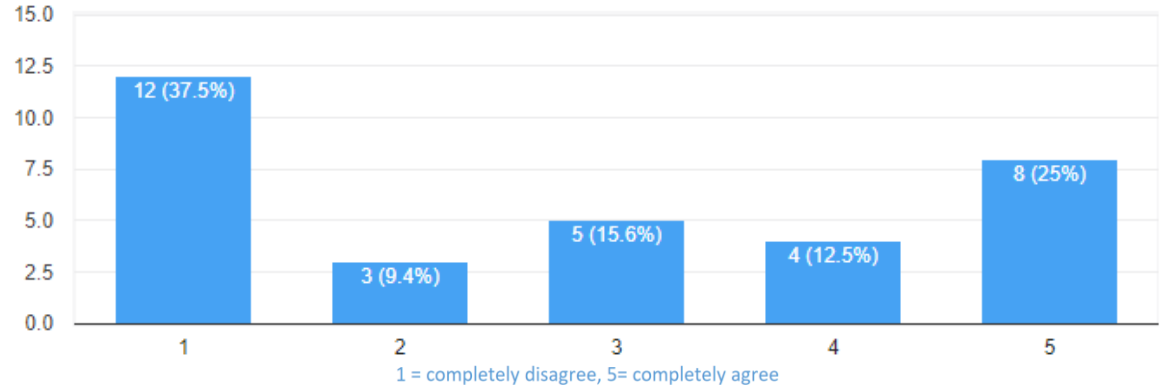

Figure 22: Are you familiar with the term "Gamification".

Finally, the students were asked to self-assess their knowledge of gamification and 37.5% responded that they do not know anything about the term. Figure 22 shows a chart related to this question. The responds to this question in the same numerical value from one to five. One means the participated students do not know anything about gamification and five means they know the term very well.

3.2 Survey for the teachers

As stated earlier eight teachers responded to the survey. The participants had from two to thirty-five years of experience and were from different departments at the LUT. Fifty percent of participants were females, 37.5% were males, and 12.5% preferred not to clarify the gender. The teachers were asked if continuous assessment motivates the students and all of them agreed that student motivation and continuous assessment are correlated. The teachers were also asked if they adopt the continuous assessment method to their courses. Figure 23 is presented to show the respond to this question.

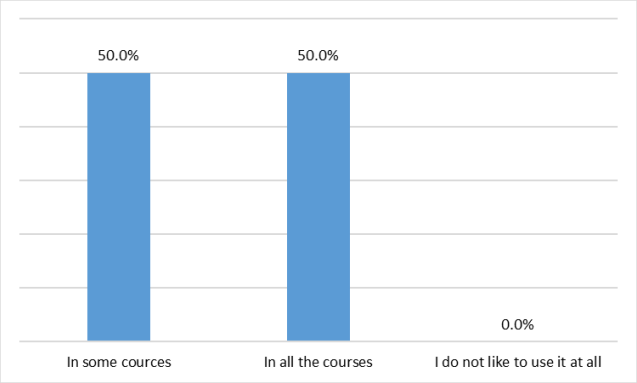

Figure 23: Do you give continuous feedback to your students during a course?

The previous subchapter stated that there is a room for improvement regarding continuous feedback at LUT and Figure 23 clarifies that 50% of the survey participants do not give continuous feedback to their students. Some of the reasons are given below:

- It depends a little bit on the structure of the course and course tasks.

- Students have more opportunities to complete the course without any stress regarding the exam.
- Sometimes it is difficult to implement the method in a course.
- I would like to use it but currently I am not able. This is because continuous assessment requires quite detailed planning.

LUT provides tools regarding continuous assessment. However, the teachers think that the university can provide more support and better tools. The teachers were asked about the tools provided by LUT regarding the continuous assessment. Figure 24 shows the results. The main tool, which LUT provides, is Moodle that according to the teachers is not very user friendly. It is just a basic solution for automation of many tasks linked to a course.

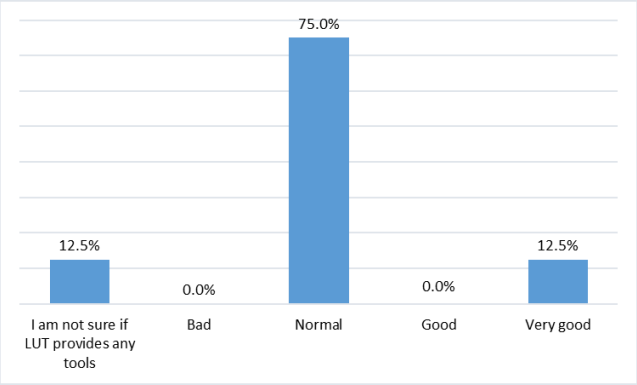

Figure 24: What do you think about the online tools that LUT provides regarding the continuous assessment?

The survey contained with two questions regarding the gamification. The first question asked about the teachers' knowledge of the term and the second one was about the provided tools by the LUT in relation to gamifying a course. Seventy-five percent of the teachers know the term very well. Moreover, one of the teachers has utilized the gamification techniques in his courses. The other teacher with 20 years of teaching experience claims that gamification is not suitable for education and a teacher who also has similar teaching experience commented that he did not have the time to think about suitable ways for utilizing gamification in his courses.

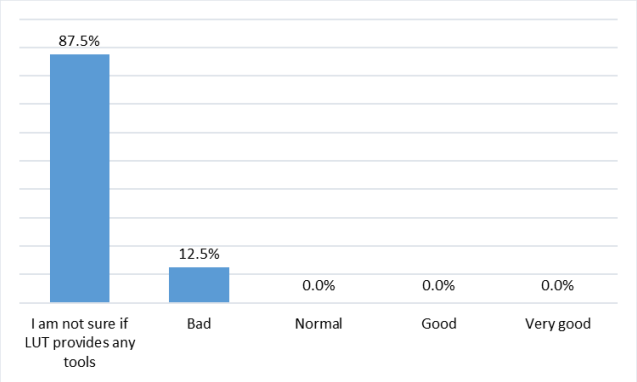

Figure 25: What do you think about the online tools LUT provides regarding the gamification?

The second question linked to gamification was about the provided tools by LUT. According to Figure 25, the survey participants think that LUT does not provide sufficient online tools in order to assist the teachers to gamify a course. Finally, the teachers were asked to identify that in which area of education the students are more likely to lose motivation. The results can be found in Figure 26. The teachers think that being present for a lecture, being active during a lecture, and completing the assignments demotivate the students. Furthermore, some of the comments related to this question are presented blow:

- Free riding kills motivation.
- A student should be involved in the process of learning. That is why sitting on lectures is not efficient.
- Due to overbooking in the modern life, students do not have time. They are multi-tasking, trying to combine work with their studies.
- Large tasks result to demotivation.

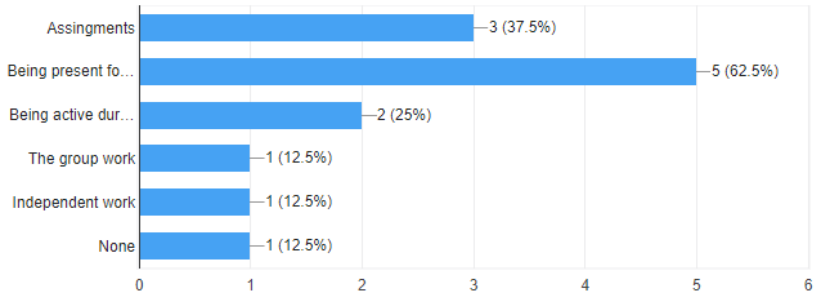

Figure 26: In which area of education the students are more likely to lose motivation.

3.3 Interviews

In order to elaborate on the teachers' answers to the survey questions, a number of interviews were conducted. The current subchapter is set to analyze the interview results by using the qualitative analysis method. The interview transcripts, which can be found in Appendix 3, was browsed through. The relevant phrases and sections linked to the research questions and the thesis objectives were noted in order to find the repeated and the connection ones. The core of the analysis was to find the problems with the current teaching methods, note the possible given solutions, and find extra relevant information.

3.4 The results

The gamification tools provided by LUT are not satisfactory, according to the teachers who participated in the survey. However, some teachers have managed to use some game elements in their courses in order to motivate the students. Continues assessment is one factor, which can inspire the learners, and the LUT educators are aware of it. The students may not attend the lectures for many reasons. Yet, it is possible to raise the attendance rate by creating an attractive course in which the students can participate in the teaching process while fulfilling the learning objectives.

Structure of a course can have a direct effect on the student's participation and motivation. The traditional lectures in which the lecturer is reading from the PowerPoint slides are deemed to be boring for the students. Short lectures, recorded speeches, and flip courses are among the solutions for the mentioned problem. By adopting the flip course method, the teacher instructs the students to pre-practice the lecture material and during the actual course hours, they can use the acquired knowledge to complete the assignments and activities designed by the teacher.

The need for automation seems to be more obvious as the course participant rate grows. LUT has adopted a tool named Moodle in order to help the teachers automate many types of assignments. According to the interviewees, Moodle has some usability issues but sufficient support is given regarding the tool and it is entirely up to the teacher to choose between the classical pen and paper approach or the online tool. It is not necessary to completely discard advantages of a face-to-face lecture and the recommended approach is to utilize the best from both online and classical method of education. Fifty percent of the teachers who participated in the survey do not utilize continues assessment in their courses since it requires detailed planning and the online tools like Moodle are there to assist the teachers.

Most of the video games revolve around the player, which makes the player the center of the attention. This attribute can be a reason for the games' popularity. (Kapp, Blair and Mesch, 2014, p178) The interviewees were asked about the personalized education and the possibility of adopting it in their courses. It is possible to personalize a course by giving a wider range of tasks and activities to the students to choose from and complete. Automation can be one way to personalize a course. However, the topic is still open for an extended research.

Group work is an important part of education according to the interviewees. Yet the method brings its own challenges such as the free riding issue. The teachers try to eliminate the mentioned issue by designing different types of grading methods such as individual interviews linked to the group work, peer assessment, and individual tasks. However, it is a big challenge to avoid the free-riding problem completely.

4 PROPOSING A GAMIFICATION TOOL FOR EDUCATION

It might be close to impossible to develop a single gamification system or tool for the education process since the same methods cannot be used for every course because of the different objectives and target behaviors. (Padilla-Zea et al., 2014) This chapter is set to propose some possible ways of gamifying a higher education level course by referring to the literature, conducted surveys, and the interviews.

4.1 Objectives, users and the target behavior

In order to know the user better and collect the possible objectives and the target behaviors a number of surveys and interviews were conducted. The system users are from different age groups and educational backgrounds. However, based on the survey results the users think that continuous assessment is motivational. According to the Figure 26, the students get demotivated due to the assignments and lecture structure. The gamified system, which will be discussed in this chapter, focuses on motivating the students during a lecture and for completing the assignments. Based on the interviews the student must have to get significant benefits from a course and its assignments. Complete transcripts of the interviews can be found in Appendix 3. Gamification has the potential to show the process of progress to the students and in return motivate them to take further actions (Langendahl, Cook and Mark-Herbert, 2016).

As stated earlier social media was more successful in engaging the students over the past years (Niman, 2014, p127-133). The targeted users of this thesis project according to the surveys are in their 20s, which means they are also affected by the social media platforms like Facebook. This can be seen as a positive attribute since the students are familiar with the web platform and its standards. The LUT students are already using the online tool for education called Moodle, which also proves the previously mentioned quality.

The teachers' mindset is important considering the gamification of a course and the assessment methods. As stated in the results of the interviews LUT provides support for utilizing Moodle in a course, however, some of the teachers choose to avoid the opportunity of automation and proceed with the traditional methods for educating their students. A gamification tool or system for education must be easy to use and evolve over time since gamifying a course is an iterative process (Werbach and Hunter, 2012, p102). The gradual change can help the users to adapt to the new system easier and gradually. The other solution for adopting an online tool is to make it obligatory and a part of the course planning. For example, continues assessment

through a gamified course can be required from the teachers by the university. It is important to mention that more focused research is required in order to find a suitable assessment and gamification tool for a course.

In summary, the target behavior for the proposed system by this thesis project is to motivate the students during and for a lecture. The targeted learners are university students from different background and in their 20s. The system aims at the teachers who are ready to try the new technology and modern methods for education. Both the teachers and the students are aware of the motivational aspects of the continuous assessment and the teachers know the term gamification. Furthermore, it is even possible that some educators are already using some game elements in their courses.

4.2 Utilizing the game elements

Choosing the right game elements for a course, which can serve the required objectives, is an essential fact linked to the success of the system (Goshevski, Veljanoska and Hatziapostolou, 2017). According to the earlier mentioned framework by (Echeverría et al., 2011), the game elements are divided into four categories: mechanics, story, aesthetics, and technology. Each category is set to fulfilling an objective. The mechanics are set to help the users reach the goals of a gamified system, the story unfolds as the game proceeds, aesthetics are the graphics, and sound effects of a design, and technology defines the input devices and utilized technology, which makes participating in a gamified system possible.

The educational system offers real rewards in a form of grades and degrees to the students. The game elements are already a part of traditional education. (Niman, 2014, p1) Yet, the used methods for education are harming the students due to the effect of extrinsic rewards. The students do not want to take part in an activity unless a grade is attached to it (Ziesemer, Muller and Silveira, 2013). A reward-based gamification system is following the same path and can harm the participants. However, this does not dismiss the effectiveness of a reward-based system if applied correctly. Reward-based gamification works well if the system is set to

teaching a skill (Reiners and Wood, 2015, p1-19) For example, for a course that teaches the skills of writing reports reward-based gamification might work well. The goals of such a course might be to teach the students to cite the references correctly and have a standard document structure. The rewards, in this case, can give the students a sense of achieving while learning a new skill and the rewards can be dropped as soon as the student has learned the required skills.

As shown in Figure 15, reward-based gamification is utilized for most of the high-level education courses. That is not aligned with the motivation version 3, which meant to teach complex skills (Pink, 2009, p 18-62). A meaningful gamification should work even without the rewards. Game elements such as avatars, stories, and social connections can be linked to a more meaningful gamification (Sailer et al., 2017). It is important to mention that the game elements and reward must not replace the real-world settings and the real objectives of the system (Reiners and Wood, 2015, p1-19).

4.3 Real time feedback and the win state

As stated earlier feedback is, a powerful tool linked to changing one's behavior (Attali, Y. and Arieli-Attali, 2014). Feedback comes in many forms and it is essential to understand that the timespan between the feedbacks can change the user experience for the positive or negative. (Stieglitz et al., 2016, p37) The concept of feedback loop, which was presented in the previous chapters, can be utilized regarding the gamification in education. The feedback must be clear and inspiring enough in order to result in further action. (Werbach and Hunter, 2012, p64) A strictly numerical feedback may not be very motivating as a LUT student mentioned in the survey. Getting real-time feedback is not necessarily an automated process. The students can participate in giving productive feedback to each other in a controlled environment. This method is part of what is called social fun that is represented in the beginning of this thesis project (Werbach and Hunter, 2012, p98-99).

Feedback guide the player to win the game. However, the win state does not necessarily mean victory. (Klopfer, Osterweil and Salen, 2009) In a university course, it is possible to simulate a

win state after completing an assignment or a project work that is a part of the course. Reaching a milestone can be a win state in a meaningful story for gamification. In a reward based gamification system, the student can get a badge or any other forms of virtual goods upon reaching a milestone. This method is chosen by online teaching platforms like the Khan Academy (Barata et al., 2013).

4.4 The proposal

This section is set to propose a gamification method for a higher education course with the above-noted objectives and users. As stated earlier a complex gamified system with many rules and settings results to demotivation (Burke, 2014, p98-99). The goal of this section is to propose a simple and yet effective tool, which is easy to understand and use for both the students and the teachers. The tool is described as a part of a complete solution. The mentioned methods in this section are not practiced in a real-life environment and the objective is to utilize the conducted secondary research in order to come up with a gamification solution for education. The targeted course for this example is a computer-programming course with the goal of teaching the basics.

The first lecture of the course starts by explaining the structure and assessment methods. The students are instructed to register in an online platform with the following characteristics:

- An avatar with an attached nickname represents the student.
- The users get access to weekly assignments with a clear deadline.
- Upon completing the assignment on time, the user gets the week's badge.
- Late submissions get the assignment points but not the badge.
- Late submission means 5 days after the deadline. The submission box will be closed after 5 days and the student loses the chance of submission and the assignment points.
- The system is automated and the students receive a grade for the week assignment right after the submission. Moreover, the mistakes will be shown to the students.
- The student who completes the assignments on time receives bonus points in addition to the badge.

- The system contains the material related to the week's assignment and the students can go through the material before attempting to complete the weekly quizzes.
- A progress bar represents the user's advancement in the online platform.

The online platform has a back-story, which unfolds every week if the user decides to complete the assignment. A meteorite is coming toward the earth and the student attempts to redirect it by completing the assignments. A new task is an attempt to save the planet Earth. Incorrect answers to the weekly assignments bring the meteorite closer to the Earth's path and correct answers take it further from the Earth. The students can visually see the impact of their activities. Weekly points, badges, and bonuses are there to assess the students continuously. However, the center of the attention will be given to the system's story.

In addition to the online platform, the course has other features, which results in the students' motivation and engagement. The importance of real-time feedback, clear goals, and back-story in a meaningful gamification is presented in the theoretical part of this thesis project and such elements were utilized in the mentioned online platform. However, social influence and teamwork are also important parts of gamification (Sailer et al., 2017).

Student participation in the lectures was one of the main objectives mentioned in the interviews. Different types of workshops will be created in order to keep the students active during a course. However, in order to invoke social responsibility, the students participate in teaching the subjects of the lectures. The quality of teaching does not have a negative effect on one's grade and the course teacher is there to guide the process. The actual planning for this practice must be designed through different iterations and evolve through experimenting with a variety of techniques (Werbach and Hunter, 2012, p102). The concept of free riding is covered here since instead of dividing the students into groups the whole class works as a team and students will not be nervous regarding the effect of a less active teammate on their grade. As mentioned, the student does not get any negative points regarding their teaching. Yet, at the end of the course, the teacher chooses three students who taught the subjects better and give them bonus points for the examination.

The weekly assignments that will be completed on the online platform represent 50% of the total grade. The other 50% comes from examination and the exam questions are taken from the weekly quizzes. Cheating is a natural human tendency (Kapp, Blair and Mesch, 2014, p137). The mentioned method would ensure that the students do the weekly assignments themselves and practice the course content. Furthermore, the advanced level students and those who cannot to do the weekly assignments completely can participate in a more difficult exam, which will be designed for them. Those students who did not do well in the weekly quizzes can also choose to take the more difficult exam, which covers the final grade entirely. The gained weekly points and bonuses will be discarded in this case. This will represent the freedom of choice and the freedom to fail which is an essential part of gamification (Fotaris et al., 2016).

It is a good practice to use the game language and the game phrases in the course as mentioned in the multiplayer classroom (Sheldon, 2012, p31-32). For example:

- The student name will be replaced with the avatar's nickname.
- The exam will be called the final level.
- The course will be referred to as the hero squid.

The other related terms are subjected to these changes accordingly. This represents the easy fun, which is covered previously and it is not connected to succeeding or failing it is just casual enjoyment (Werbach and Hunter, 2012, p98-99). Appendix 4 contains details regarding the course grading system and the next section of this subchapter is set to explain the proposed gamification in the light of self-determination theory. Moreover, the section explains intrinsic and extrinsic motivation linked to the proposal.

4.4.1 The proposal in the light of self-determination theory

Self-determination theory is linked to intrinsic motivation by identifying three drivers: Autonomy refers to willingness when doing a task in another word, freedom of choice. Competence is about mastery and challenge that in return would encourage the user to engage deeper in an activity. Relatedness represents the need for social relations between

participants, which can raise the sense of responsibility in the people. (Goshevski, Veljanoska and Hatziapostolou, 2017; Deterding, 2015; Seaborn and Fels, 2015)

The student who participates in the gamified course presented in this chapter has the freedom to engage in the weekly activities or the final examination. The student also has the freedom to fail. The weekly assignments are there to improve the student's knowledge and failure to complete several of them does not have a drastic effect on the student's grade since the missing assignment's point can be replaced with the bonus points, which are given to the participants who do their assignments on time. Moreover, as stated earlier the student always can replace the assignments with a more tailored exam.

Competence is the second driver of the SDT (Deterding, 2015). The students see their progress during the course in weekly bases and the progress bar helps them to track the advancement visually. The back-story is the heart of the proposed gamification system, which motivates the learners to come back and complete the assignments in order to see the ending of the story while learning new programming skills. The badges are set to motivate the students to submit their assignments on time. Yet, they do not have any effect on the student's grade. In summery the student can visually see the road to mastery by participating in the gamified course and the motivational force, in this case, is intrinsic by realizing the outcome of the freedom of choice and the motivational aspects of a back-story (Burke, 2014, p29).

Relatedness is the final driver of the SDT (Deterding, 2015). The students' participation in the teaching activities raises the social relatedness, which in this case is linked to both the intrinsic and the extrinsic motivation. The students do not necessarily get any extra points for teaching the course content. However, the possible final bonus is an extrinsic motivator to learn a new skill, which is teaching (Pink, 2009, p 18-62). Subchapter 4.2 is about the future of gamification and the personalization in the user experience that can be utilized to improve the current gamification proposal in a possible future research.

4.4.2 Expected impacts

The gamification system proposed in this chapter can affect the students' motivation linked to the given objectives. Moreover, the system is set to satisfy the mentioned users covered earlier in this chapter. Regarding the proposed gamification system, the following table shows the connection between the utilized game elements and principles with the expected outcome.

Table 5: Connecting the game elements/principles with the expected outcome.

Game element/principle	Expected outcome
Clear rules	Eliminates confusion and in return increases motivation
Avatars and nicknames	Linked to accountability and relatedness
Badges and bonus points	Sense of accomplishment motivates the students to complete the assignments on time in order to receive badge and points
Automation	Grading error will be decreased
Progress bar	Virtual presenter of task completion. The students can see their progress
Utilizing the game terminology	Since most of the students are in their 20s the game terminology can be fun for them
Freedom of choice	The students who do not find gamification motivating can choose to complete the course by taking an exam
Social relations	The students participate in the lectures due to the social pressure. The sense of responsibility will be raised
Storyline	The students can clearly see the impact of their activities and want to know the end of the story. This is linked to motivation regarding completing the weekly assignments
Freedom to fail	The students do not lose motivation if they fail to complete the weekly assignments since they still have the chance to complete the course with an exam
Levels	The students can see that they earn programming knowledge when completing the weekly levels. They get motivated to continue the path of success
Win state	Completing weekly assignments, passing the exam, and completing the backstory represent the win state. This will make the students pay attention to the process in addition to the final outcome

4.5 Future directions and personalization in the user experience

Games evolve as the technology advances and in return, they become more popular among all age groups as shown in Figure 1 (The Entertainment Software Association, 2017). This section focuses on the possibility of using augmented reality and virtual reality within gamification and its connection to education. The subchapter also analyses the possible future of gamification within the mentioned domain. The proposed gamification solution can be improved in a possible future work by utilizing the mentioned directions and technology in this section.

Virtual reality is a computer-generated simulation of the real world environment and/or experience, and augmented reality is a computer-generated enhancements layer atop of an existing reality. Both of the trends are in the center of attention for enriching the learner experience. Interactive learning is possibility with the newly mentioned technologies. Virtual and augmented reality are already enabling the learners to explore the environment in 3D. Research suggests that virtual reality in higher education can improve the independent learning and problem-solving skills. (Costello, 2017, p121-123)

Group work and collaborative Learning is another possible usage of augmented reality. Researchers suggest that the primary focus of the educators must be on intrinsic and extrinsic motivation that supports a friendly engagement between the learners. The adoption of augmented reality in a gamified course can help the students to develop their communication skills while interacting with the real-world settings and virtual resources. Moreover, the development of augmented reality books enable the users to react with historical environment that otherwise was not possible. Although the books were not built around gamification techniques, they offered readers a playful experience while keeping them motivated within the learning process. Furthermore, virtual reality can reduce the education costs by replacing the study resources with virtual ones (Costello, 2017, p125-132)

People are not the same, so why should they have a similar approach to education. Most of the games put the player at the center of attention and the game progresses based on the player's actions (Kapp, Blair and Mesch, 2014, p178). However, most of the current methods of gamification in education does not support personalization (Dicheva et al., 2015). Although there is not a consistent set of standards for achieving personalization, it is possible to give the student different options to achieve the course learning objectives. It is also possible to develop a more advanced personalized system by analyzing the students' background and educational records in order to create a learning environment, which revolves around them. An example of such a system can be Amazon's recommendation system for the customers. (Caballe and Clarisó, 2016, p25-27) Gamification is a growing phenomenon referencing to Figure 6, however, more focused research is required regarding some essential gamification attributes like personalization (Dicheva et al., 2015). The future of gamification in education may be linked to the willingness of changing the teaching methods and utilizing the up-to-date techniques.

5 CONCLUSION

The research questions will be answered in this section of the thesis work. However, the reader is advised to read the entire thesis document in order to gain a clear picture of the thesis objectives, scope, and the results. A brief explanation of the managerial implications can be found in the next subchapter.

5.1 Managerial implications

At the initial stage the student participated in two online gamification courses in order to expand his knowledge of the concept and to complete, the secondary research four major scientific databases were searched through and as a result, 49 papers were chosen in addition to 12 books and 2 studies. The material was looked through carefully in order to find relevant information linked to the pre-defined research questions. Moreover, in addition to the topic proposal and the project plan all of the utilized research material was presented to the thesis advisor for approval at the early stages of this project. The thesis advisor has monitored the

process regularly and communicated his guidance through the steering meetings and electronic mails. The meetings were documented by the student and shared with the advisor in a prepared online platform.

In order to complete the primary research, questionnaires were sent to a randomly selected group of teachers and students of the Lappeenranta University of Technology. Furthermore, a number of semi-formal and semi-structured interviews were conducted to elaborate on the teachers' experience regarding continues assessment. The interviews were face-to-face and recorded. The interview transcripts, which can be found in Appendix 3, were browsed through for analysis and the results are presented in chapter three. In addition to answering the research questions, both of the previously mentioned research methods were used in order to find a gamification solution for the given users and the set of objectives.

5.2 Answers to the research questions

The presented thesis has answered two research questions throughout its length. However, the current chapter is set to provide concrete answers to the mentioned questions from the introductory part. The first question was divided into two sub-questions in order to cover more details. The question and its sub-questions are linked to the continuous assessment, gamification, and its impact on the student motivation. The second research question is about developing yet another gamification tool for education and what should be taken into an account while developing such a system.

1. How can gamification be utilized regarding the continuous assessment in the field of education? As stated earlier gamification is directly linked to the continues assessment (Simionescu and Martin, 2016). Continues assessment reduces the feeling of uncertainty for the participants. People like to be assessed and the need for social comparisons explains the popularity of badges, points, and leaderboards in a gamified system (Reiners and Wood, 2015, p209-2011; Niman, 2014, p93). However, Gamification is more than the addition of points, badges, and leaderboards. It is about

turning a loss into success the goal is not as important as the progress of the learner. People do not like to be told what to do. The teacher is there to assist the student through the educational journey and the student's freedom of choice should not be limited drastically. Due to the adaptation of engagement loops, social media was more successful in engaging the students over the past years comparing to the educational system. While using the social media people are free to tell their stories and share their experiences. A service like Facebook provides the freedom to tell stories and collaborate on a verity of subjects. The educational system can learn from the social media experience in order to improve its methods. Learning for the students must become a way to establish an identity, which they desire and it is close to their lives. (Niman, 2014, p127-133)

1.1. To what degree gamification has been used in relation to the continuous assessment in the field of education and what were the adopted game elements? Feedback is a powerful tool to change people's behavior, motivate them, keep them in the desired path, and psychologically influence them (Attali, Y. and Arieli-Attali, 2014). The educational system is responsible for harming the students through the traditional grading systems. The students are not willing to participate in a learning activity unless a grade is assigned to it. Reward-based gamification is continuing the same approach, which means harming the students further. (Reiners and Wood, 2015, p1-19) Continuous assessment is also possible through a storyline, the example of the virtual robot called Gidget is a successful attempt, which resulted to the improvement of the students' performance (Mohd Zaid, Sanmugam and Abdullah, 2014). Assessment through storyline that can be linked to the intrinsic motivation is not used in the most of the gamified systems for the higher education (Dichev and Dicheva, 2015).

1.2. What is the gamification impact on the students and their level of motivation? There are examples of gamification in education, in the section called

"Gamification in the field of education" that proves the positive effect of the employed methods and techniques on the students' motivation. This is the reason for adopting gamification by many companies including Khan Academy, Treehouse, Udemy, and Duolingo (Fotaris et al., 2016). Gamification is intrinsically motivational regardless of any external rewards (Seaborn and Fels, 2015). Furthermore, the conducted survey results that is presented in chapter 3, suggested that continues assessment motivate the students. Gamification is a good approach for assessing the students' progress continuously (Simionescu and Martin, 2016).

2. How to implement yet another gamification tool for education? As stated earlier gamification in education is an iterative approach (Werbach and Hunter, 2012, p102) yet, the same methods cannot be used for every course since the objectives and target behaviors are different (Padilla-Zea et al., 2014). On average only 26% of the gamified systems for university-level education managed to positively change the student behavior (Dichev and Dicheva, 2017). The mentioned framework in the second chapter identifies the following six steps: business objectives, target behavior, players, activity loops, and fun in order to develop a gamification system (Werbach and Hunter, 2012, p86-91). The presented gamification proposal in chapter 4 is developed based on the SDT and the focus is on the intrinsic motivation. The expected outcome from the adopted game elements for the gamification proposal are clarified and the users and the objectives are collected from the students and the teachers of LUT. However, the presented methods can be adopted for courses with the same objectives in other educational institutions.

5.3 Limitations and future work

The research questions were answered in the previous subchapter and a gamification system is presented in chapter 4. However, due to the lack of time, the system could not be implemented in a real-life situation. The research and the planning are covered throughout this

thesis work and the next step is to develop and test the suggested gamification tool. The future of gamification depends on the amount of the focused research on the games and their related technology, traditional board games and role-play may not be as popular as the video games among the youth, and gamification techniques must stay up to date in order to continue the path of success as seen in Figure 6. (Basten, 2017; The Entertainment Software Association, 2017) As suggested in chapter 4 the future of gamification in education may be linked to the willingness of changing the teaching methods. Developing a more personalized education experience through gamification requires more research (Dicheva et al., 2015).

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APPENDICES

Appendix 1: Survey for the LUT students

* Required

1. **Continuous assessment is the educational policy in which students are assessed regularly over most of the duration of their education. Do you get enough continuous feedback for your performance DURING the courses in LUT?** *
   Mark only one oval.

	1	2	3	4	5	
No, I do not	◯	◯	◯	◯	◯	Yes, I do

2. **Please elaborate on your answer to the previous question.**

3. **Does continuous assessment for your performance DURING the courses motivate you?** *
   Mark only one oval.

	1	2	3	4	5	
No, it does not	◯	◯	◯	◯	◯	Yes, it does

4. **Please elaborate on your answer to the previous question.**

5. **Do you consider your final grades in LUT to be fair?** *
   Mark only one oval.

	1	2	3	4	5	
Not at all	◯	◯	◯	◯	◯	Yes, I do

Appendix 1 continued

6. **Please elaborate on your answer to the previous question. (How the situation could be fixed or improved)** *

7. **Are you familiar with the term "Gamification"** *
Mark only one oval.

	1	2	3	4	5	
Not at all	◯	◯	◯	◯	◯	I know the term very well

8. **Please elaborate on your answer to the previous question.**

9. **Gender** *
Mark only one oval.

- ◯ Female
- ◯ Male
- ◯ Prefer not to say

10. **Age** *

11. **Are you currently a student working towards a Bachelor's, Master's or PhD degree?** *
Mark only one oval.

- ◯ Bachelor's
- ◯ Master's
- ◯ PhD
- ◯ Other:

12. **What is your faculty?** *

Appendix 1 continued

13. **What is your year of study?** *
Mark only one oval.

- ◯ First year student
- ◯ Second year student
- ◯ Third year student
- ◯ I am studying in LUT for more than three years
- ◯ I am a graduate student

14. **Do you have any additional comments or concerns you would like to share?**

_____

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Appendix 2: Survey for the LUT teachers

* Required

1. **Continuous assessment is the educational policy in which students are assessed regularly over most of the duration of their education. Do you use this policy DURING your courses and give continuous feedback to your students?** *
   Mark only one oval.
   - ◯ In some cources
   - ◯ In all the courses
   - ◯ I do not like to use it at all

2. **Please elaborate on your answer to the previous question. (Why do you use the continuous assessment and why you cannot or you do not want to use it)** *

3. **Please explain your teaching methods briefly** *

4. **In which area of education the students are more likely to lose motivation?** *
   Check all that apply.
   - ☐ Assingments
   - ☐ Being present for the lectures
   - ☐ Being active during the lecture
   - ☐ The group work
   - ☐ Independent work
   - ☐ None

Appendix 2 continued

5. **Please elaborate on your answer to the previous question.**

6. **Do you think that continuous assessment motivates the students?** *
Mark only one oval.
- ◯ Yes
- ◯ No
- ◯ I am not sure

7. **Please elaborate on your answer to the previous question.**

8. **Are you familiar with the term "Gamification"** *
Mark only one oval.
- ◯ 1 - Not at all
- ◯ 2 - A little bit
- ◯ 3 - I know the definition
- ◯ 4 - I know it very well
- ◯ 5 - I have utilized it in my courses

9. **How gamification can be utilized in order to motivate the students in your opinion**

10. **What do you think about the online tools that LUT provides regarding the continuous assessment?** *
Mark only one oval.
- ◯ 1 - I am not sure if LUT provides any tools
- ◯ 2 - Bad
- ◯ 3 - Normal
- ◯ 4 - Good
- ◯ 5 - Very good

Appendix 2 continued

11. **Please elaborate on your answer to the previous question.**

12. **Gamification is the application of game-design elements and game principles in non-game contexts. What do you think about the online tools that LUT provides regarding the gamification?** *
Mark only one oval.

- ◯ I am not familiar with the term
- ◯ I am not sure if LUT provides any tools
- ◯ Bad
- ◯ Normal
- ◯ Good
- ◯ Very good

13. **What is your faculty?** *

14. **How many years of teaching experience do you have? (university level)** *

15. **Would you consider having an interview related to the subject? Please provide us with your contact information.**

16. **Gender** *
Mark only one oval.

- ◯ Female
- ◯ Male
- ◯ Prefer not to say

Appendix 2 continued

17. **Do you have any additional comments or concerns you would like to share?**

_____

_____

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_____

_____

Appendix 3: Interview transcripts

Interview: one

Interviewer: How to motivate students to attend the lectures?
Interviewee: I think the students' meetings in which the students get together can stimulate them to attend the course as well. During the lectures, the students' problems can be discussed and it can ease the study process. Some courses can be entirely online, but some require face-to-face sessions for experience exchange and problem solving.

Interviewer: I am thinking to have 30 minutes' lectures instead of long ones and most of the course can be online. During these short sessions, students can be helped with their problems. What is your opinion about it?
Interviewee: Yes, I think that this is a good option.

Interviewer: What is your opinion about "personalized education"? Is it possible to apply it at LUT sometime soon?
Interviewee: If we are talking about person-based education, the number of people in the course should be limited. Personalized course for 30 people is not possible; it requires a lot of time and effort from the teacher. Managing of such course is very time consuming. Some online courses are rather personalized, especially when we are talking about the students who want to complete the course earlier than the rest of the group. I can give them the extra tasks to complete and so on.

Interviewer: Another question is about free riding. What do you think about it, and how to combat it?
Interviewee: I try to fight free riding by creating individual assignments.

Interviewer: 50% of the teachers who participated in the survey stated that they do not use continuous assessment in their courses. You are the one who uses continuous assessment. Why do you think other teachers do not use it?
Interviewee: Continuous assessment implies huge amount of work and it is very time consuming. Continuous assessment should be at the same level as the exam. All the topics should be covered. Students should have the choice: to do continuous assessment tasks or to participate in the exam. Some teachers are conservative and do not want to apply it. Teachers have the freedom to choose the assessment but it should fit into the description of the course.

Interviewer: As I can see from your previous answer, you already utilize some of the gamification techniques. Like the freedom of choice.
Interviewee: Yes, some elements of the gamification, but not really the gamification.

Interviewer: What do you think about the usability of the Moodle platform? Did you have any usability issues concerning the usage of the Moodle?
Interviewee: There are training courses for the teachers how to use Moodle. There are people who can be asked if there are some issues. It is up to the teachers if they want to use the support or not. Some things are easy to do via Moodle, some more difficult. For those who want to use it and have some problems, there is an excellent support.

Appendix 3 continued

Interview: two

Interviewer: Why do you think some teachers do not use continuous assessment?
Interviewee: It is kind of tradition. I think that most of the teachers think that the only way to see what students really leant is through the closed-book exam.

Interviewer: What does make you to apply continuous assessment?
Interviewee: For me it is enough to see the students' progress during the course. This progress can be tracked via assignments. In real life, we have internet and we can use it any time. Therefore, I think it is fine if students use different kind of sources that can help them.

Interviewer: According to the chart I got, teachers believe that being present during the lectures and completing the assignments are the factors that demotivate the students. Why do you think the students do not want to attend the lectures?
Interviewee: I think it is important to make the time beneficial for the students who are coming to the lectures so they learn something. Some students can study independently and some prefer attending the lectures. The main thing that demotivates the students is when they feel that they waste their time.

Interviewer: So if the lecturer makes the students to participate in the lectures, it can be motivating for them. Is it true?
Interviewee: I think, yes. Some teachers are also that good and they teach in a way that students themselves want to participate in the lectures, even though they do not have to. Just listening and not to be active in the lecture can be boring. Such lectures can be easily recorded, so students can watch the lectures whenever they like.

Interviewer: What do you think about free riding, how it can be eliminated?
Interviewee: Teamwork is becoming important. I do not know exactly how free riding can be eliminated. Students are adults and they study for themselves. If someone does not want to do anything, others do a little more and it can be beneficial for them.
Interviewer: What is your opinion about "personalized education"? Is it possible to apply it at LUT sometime soon?
Interviewee: It is a very interesting topic. I think it is possible to apply personalized education, for example, to give a wider choice of topics for essays. Different learning techniques should be also taken into consideration. It is easier to apply personalized education to some courses than to the other ones, but I must say that it is time consuming.

Interviewer: What do you think about the usability of the Moodle platform? Did you have any usability issues concerning the usage of the Moodle?
Interviewee: There are courses to teach us about how to use Moodle. It was very helpful and clear. We can get support whenever it is needed. I do not think Moodle is difficult; however, it can be time-consuming for some tasks. It depends on teachers if they are willing to use it. Moodle enables the teachers to preform continuous assessment.

Appendix 3 continued

Interview: three

Interviewer: How to motivate students to attend the lectures?
Interviewee: I think that students should want to come to the lectures; they should understand why lectures are important.

Interviewer: What is your opinion about "personalized education"? Does today's educational system evolve around student or not? Is it possible to apply it at LUT sometime soon?
Interviewee: Automated systems are used to evaluate the assignments and some kind of personal feedback is given to the students. Courses with small amount of students are already pretty personalized. Teacher serves as a guide, to facilitate the learning.

Interviewer: Do you think that the set of proper tools could motivate the teachers to automate and personalize the process for larger groups? Does LUT have such tools already now?
Interviewee: I do not know if such tools already exist. I do not know if we can come up with certain gamification tools that would suit students. This is a research question.

Interviewer: What do you think about free riding in-group work, is group work important and how free riding can be eliminated?
Interviewee: Group work is important because this is used in real work life. Free riding can be eliminated through the personal interviews after completing a group assignment, after them, some students can get some extra points. Peer assessment can be also helpful.

Interviewer: Why do you think students do not want to participate in the lectures?
Interviewee: Some students want to attend the lectures, because they do not want to read the material themselves, some do not mind reading. Students should not just attend, but also study, not playing with phones. Students have different backgrounds. They may think that something is easy, start skipping the lectures and then they are so much behind.

Interviewer: How do you motivate the students?
Interviewee: I use flip course method the students come to class to work, so they come prepared. They come to class to solve problems.

Interviewer: Many teachers see continuous assessment as a motivator for the students. What do you think stops them from using it?
Interviewee: I do not think that continuous assessment has just benefits, it can be very stressful for the students and if a student is stressed, he/she cannot learn well. Old-fashioned way is via exams and lectures. It works if the group is very big. Grading can be a problem if we are talking about continuous assessment. It can be fine if the teacher has support or the process is automated.

Interviewer: What do you think about the usability of the Moodle platform? Did you have any usability issues concerning the usage of the Moodle?
Interviewee: There are some usability issues and there is a room for improvement. I am still learning how to improve my work with Moodle and I may not to know all the tools the Moodle has. If there are issues, I can get support.

Appendix 4: Grading example for the proposed gamification system

Structure

The course administrator can structure her course by using the system's admin area. It is possible to add the course duration and questions for each week. The questions are multiple choice and each question will have ten points. The user can choose to submit the weekly assignment on time and get five bonus points. For example, let us say the user has zero points for this week because she answered all the week questions incorrectly. However, if the assignment submission is on time the user gets five points that will be added to the total points. In order to invoke social responsibility, the students participate in teaching the subjects of the lectures. The quality of teaching does not have a negative effect on one's grade. Yet, at the end of the course, the teacher chooses three students who taught the subjects better and give them bonus points for the examination.

Exam

This gamification system wants to combine the traditional way of education with the online education, which is why there will be an exam at the end of the course. The online course and weekly assignments will make up 50% of the course and the examination covers the remaining 50%. The exam is not obligatory if the student decides not to take it. Moreover, students can decide to ignore the weekly assignments completely and take part in a more detailed exam, which covers the entire grade.

Example of the Workflow

- The course has 5 weeks; each week has five questions; each question has 10 points: 5x10=50.
- If all the assignments are completed on time, the user gets 25 points in total.
- The user answers all the weekly questions correctly except two, which means she will gain 230 points. The total is 50x5=250.
- The user gains 25 extra bounds points. 20 points will be given to the total weekly assignments because two questions were answered incorrectly which means 5 points will be left. 5/2=2.5 points for the final exam.
- The final exam has five questions and each of them has 10 points with the total of 5x10=50. The user will answer four of them correctly, which gives her 40 points. With the 2.5 points from the bounds questions 42.5 points.
- The user's final points for the online tasks will be 50% since all the 250 points were gained and for the exam 42.5% which makes the total 92.5% of the course.
- The student did not get the five bonus points for teaching the course content.
- The final grading system is:
    - 50% = 1
    - 60% = 2
    - 70% = 3
    - 80% = 4
    - 90% = 5
- In this case, the user gets the grade 5 for the course since she got 92.5%.