Tallinn University
Institute of Informatics

Gamification in Higher Education

The Case Study on the “Game Interactions” Course

Master Thesis

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The Author's Declaration

I hereby declare that, apart from work whose authors are clearly acknowledged, this document is the result of my own and original work.
This thesis has not and is not being submitted for any other comparable academic award.

The thesis has been supervised by MSc Martin Sillaots.

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Introduction

Games are tools for learning for humans as well as for many other living species. Games help to simulate real-life situations in a safe and often entertaining environment. “Play is not an optional leisure activity, but a biological imperative that supports our cognitive and emotional well being, occupying an important role in our development as humans” (Galarneau, 2007). Games often tend to engage players so much that they are emotionally immersed in the process and at the same time enjoy the tasks and challenges the game offers to reach the desired goal.

Learning in the other hand is something that is usually not considered fun or entertaining, therefore it is much more challenging to keep the students motivated to engage in studies. As Prensky (2002) said, one of the biggest problems with all formal learning is to keep the students motivated enough to stick with the learning process. Ideally the students would feel pure joy of connecting to the ideas and study materials, but unfortunately this happens less frequently than the educators would like (Prensky, 2002). To engage in the act of gaining knowledge or skill, learners must be motivated (Paras, Bizzocchi, 2005) just like they would be engaged in playing a good game. But the real challenge is, how to create the situation in the learning process to make the students feel emotionally engaged and motivated to learn.

One of the ways to reach the same level of motivation in learning process as in game playing is to combine the two. It means to use game elements in the learning process or creating special games for learning. Although the games industry has grown rapidly over the last decades, the use of games in education is still limited (Westera, et.al., 2008). In the 90s, a popular term that was taken into use was “edutainment”, the aim of which was to simultaneously entertain and educate (Charsky, 2010). But by now, edutainment has received a terrible reputation for being the worst type of education, drill and practice activities masked with less than entertaining game play (Charsky, 2010).

Another branch of games that can also be used for educational purposes is serious games. Serious games opposed to edutainment games are not trying to be entertaining. “Serious games use instructional and video game elements for non-entertainment purposes and attempt to create instructionally sound and relevant learning experiences for a wide variety of audiences and industries.” (Charsky, 2010).

In this study, the author uses the term gamification as one part of serious games. Gamification means using game design elements in non-game contexts (Deterding, 2011). Whereas "serious game" describes the design of full-fledged games for non-entertainment purposes, "gamified" applications merely incorporate elements of games (Deterding, 2011). The research of this thesis concentrates more on the gamification concept than the concept of serious games, but it is important to describe the context of both terms.

It is a great challenge for the educators to engage students on the study process. Using game elements in the learning process could be one of the solutions to drive students' motivation, but how should it be done and how to measure the results?

In the process of this research, the author's aim is to understand through the case study on a gamified course, what kind of gamification elements of the course performed the best in creating the flow effect for the students and which elements did not succeed in doing it. Also it is interesting to see what were the expectations of the course instructor when designing the course with game elements and did the expectations come true.

The research questions of the study are the following:

- Did the course manage to engage the users enough to fulfill the criteria for generating gameflow?
- What were the instructor's (game designer's) expectations for using game elements in the course and did they come true?
- What could be the future suggestions for designing courses with gamification elements?

There are many theories that try to explain, what motivation is all about. In the framework of this study, the author starts looking into the concept of motivation from the theories of internal and external motivation, then concentrating more on internal motivation, flow theory, gameflow theory and finally game enjoyment criteria that is based on the combination of game elements and criteria for creating gameflow (Figure 1).

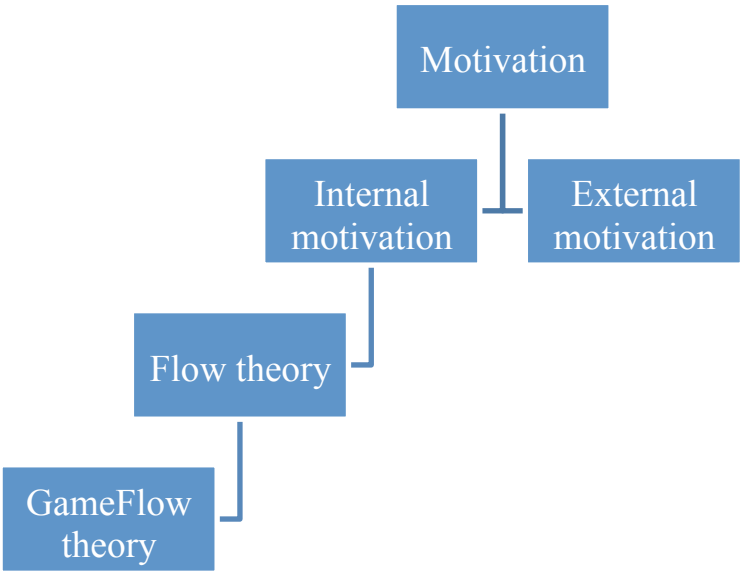

Figure 1 Chart of Motivation Studies

For further research, this study could perform as one example how to measure flow effect in gamified courses and offer some suggestions for how to design a gamified course.

The aim of the following literature review is to understand the concepts of games, serious games, gamification and using games in higher education to create a context needed for the study. The research part of the study focuses on one example case of a course Game Interactions that was carried out in Tallinn University in 2013 spring semester. The research consists of two parts: survey among the participants of the course and an interview with the course instructor.

1 Literature review

In literature review the author will give an overview of the term game and then precede more in depth with the topics of serious games, gamification, the concept of gameflow and using gamification to enhance learning in higher education.

1.1 Game and Playing

Playing is an essential part of life for every living being. It is a way of spending time and having fun but also a way of learning by simulating the situations one could face in real life.

A game is a form of play with goals and structure (Maroney, 2001). Game can be defined very differently depending on the format, environment, goals and playing methods of the game. Juul (2003) analyzed seven definitions of game produced by different researchers dating back from 1950 to 2003. Suits (1967) opposes playing to working, which means that work is something that is serious and technical, while playing is fun and enjoyable (Prensky, 2002). Salen and Zimmermann (2003) define game as a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome. Caillois (1961) sees game as an activity that is essentially: Free (voluntary), separate [in time and space], uncertain, unproductive, governed by rules and make-believe.

The author suggests that the most relevant definition in the context of this research would be Suits' (1967) definition: "To play a game is to engage in activity directed towards bringing about a specific state of affairs, using only means permitted by rules". In the context of this study, it is important to understand how to achieve the sufficient level of engagement of the game and how do the rules of the game influence the process of reaching the desired goal or state of affairs.

All these definitions assume, that there are certain characteristics that turn an activity into a game. The next chapter will analyze some examples of game characteristics and suggest a frame for game characteristics relevant for this study.

1.1.1 Characteristics of Game

Suits (1967) in his definition of game concentrates on the fact that while playing games people are voluntarily accepting and following the rules for reaching certain goals. "To play a game is to engage in activity directed toward bringing about a specific of affairs, using only means permitted by specific rules, where the means permitted by the rules are more limited in scope than they would be in the absence of the rules, and where the sole reason for accepting such limitation is to make possible such activity." (Suits, 1967). But in addition to the rules there are other principles that characterize the activity of game.

According to Charsky (2010) the main characteristics of game are:

- Competition that motivates a player to win. Competition could be another player(s) or a computer for example (Charsky, 2010). In the other hand, Adams (2010) says, that a game does not always have to have competition characteristics.
- Goals – winning another player or computer could be the goal of the game. Other types of game goals motivate the player to become better at something by repeating the activity over and over again, for example drill activities (Charsky, 2010, 182).
- Rules are the framework of the game that limit the actions a player can and cannot do (Charsky, 2010, 183).
- Choice refers to the number of options and decisions a player can make before and during game play (Malone & Lepper, 1987)
- Challenges are the tasks and activities, the player has to go through to reach the goal of the game (Malone & Lepper, 1987).

In addition to Charsky's five elements of game characteristics, Whitton (2010) also suggests the following defining characteristics for games:

- Exploration – there is a context-sensitive environment that can be investigated.
- Fantasy – the environment, characters or narrative are make-believe.
- Interaction – an action will change the state of play and generate feedback.
- Outcomes – there are measurable results, like scores.
- People – other individuals take part.
- Safety – the activity has no consequence in the real world.

Adams (2010) says that the main elements of a game are play, pretending, goal and rules. Pretending is an interesting characteristic, as it makes the players create a notional reality in

their minds that makes it acceptable for them to obey the rules of the game which in reality are usually not necessary for reaching the same goal (Adams, 2010).

Although some of the game characteristics vary in different definitions from different researchers, the core characteristics of the importance of engagement, rules and goals still stay the same.

1.1.2 Types of Games and Game Studies

Games can be categorized by many different characteristics and are usually classified by game playing environments or the game playing goals. It is common for a game to fit into more than one group (Hogle, 1996).

The top six study fields lated with game studies are (Aarseth, 2005):

- Game ontology (ludology) - the study of games and gaming, especially video games (Oxford Dictionary, 2013);
- Game criticism & history;
- Serious games (learning games, persuasive games, advergaming) – the games used for training, advertising, simulation, or education (Susi, Johannesson, Backlund, 2007);
- Game sociology, economics, and ethnography;
- Game design theory studies the main elements of what a successful game consists of;
- Game computer science (AI, visualization, content management, etc.).

This study concentrates mainly on serious games and gamification methods that serve an educational purpose. Games for purposes such as education, training, problem solving, team building, and corporate marketing are still emerging fields (Epper, Derryberry, Jackson, 2012) which is why it is important also for this study to concentrate more on the concept of learning through serious games and gamification.

1.2 Serious Games

Serious games usually refer to games used for training, advertising, simulation, or education and are designed to run on personal computers or video game consoles. The main target markets for serious games are military, government, corporate, healthcare and education (Susi, Johannesson, Backlund, 2007).

The term serious game was already introduced in 1970 by Clark Abt. "The oxymoron of Serious Games unites the seriousness of thought and problems that require in with the experimental and emotional freedom of active play. Serious games combine the analytic and questioning concentration of the scientific viewpoint with the intuitive freedom and rewards of imaginative artistic acts," (Abt, 1970). Although Abt did not refer to digital games in his book, his definition is also applicable to both computer based as well as non-computer based serious games.

1.2.1 Serious Games versus Entertaining Games

Serious games differ from entertaining games by the goal and focus, why the game is being played and different simulation and communication complexities (Johnson, Vilhjalmsson, Marsella 2005). While gamers, who are used to playing entertaining games, prefer the rich experience of the game (the environment, graphics, challenges and gameplay) serious games are more focused on the problem solving than providing the rich experience. Serious games focus on the elements that help to learn something, while entertaining games are played purely for fun. Johnson, Vilhjalmsson and Marsella (2005) also say that while entertaining games can allow using random numbers, chances in the game to simplify the simulation process, then serious games should response more to the conscious decisions made by players than to chance. Table 1 shows some of the differences between serious games and entertaining games according to Johnson, Vilhjalmsson and Marsella (2005).

	Serious games	**Entertaining games**
Expectation	Problem solving in focus	Rich experiences preferred
Focus	Important elements of learning	Having fun
Simulations	Concious decisions of the players needed for workable simulations	Simplified simulation processes

Table 1 Difference between Serious Games and Entertaining Games

Although serious games have an educational purpose and are not played only for fun, it does not mean that they are not or should not be entertaining (Abt, 1970). The history of serious games shows many examples of games that have been developed for "serious" purposes already, for example for practicing war situations. For example chess is a game that imitates a battle situation.

1.2.2 Other Related Concepts

There are other concepts of game that relate to serious games such as e-learning, edutainment, game-based learning and digital game-based learning (Susi, Johannesson, Backlund, 2007).

E-learning refers generally to learning with the help of interactive technology. It is a rather general concept that relates to computer-enhanced learning, computer-based learning, interactive technology, and commonly and distance learning (Johnson, Vilhjalmsson, Marsella 2005).

Edutainment is education through entertainment (Susi, Johannesson, Backlund, 2007). Once very popular edutainment was considered to be the solution for popularizing education, but failed due to being drill and practice activities masked with less than entertaining game play (Charsky, 2010).

Game-based learning and digital game-based learning are probably most similar to serious games. Game-based learning also involves using entertaining games for educational purposes. Within an effective game-based learning environment, players work toward a goal, choose actions and experience the consequences of those actions along the way (Tyrbus, 2009).

1.2.3 Main Characteristics of Serious Games

According to Johnson, Vilhjalmsson and Marsella (2005) there are certain educational artificial intelligence functions needed for serious games. These are:

- Gameplay – Prensky (2002) says that the reason computer games are so engaging is because the primary objective of the game designer is to keep the user engaged. Good gameplay does not come from the game graphics, but from the continual decision making and action that engages the learner and keeps him or her motivated to continue (Johnson, Vilhjalmsson, Marsella, 2005).
- Feedback - "Feedback – sending information back to the user about what action has actually been done, what result has been accomplished – is a well-known concept in the science of control and information theory"(Norman, 1998). Good games provide users with feedback on their actions, so that they know how well they are doing and can seek to improve their performance (Johnson, Vilhjalmsson, Marsella, 2005).

- Simple interface – Well defined simple interface helps to guide the player during the game (Johnson, Vilhjalmsson, Marsella, 2005) and provide information about the player's location (Whitton, 2010).
- Challenge - An important aspect of game design is ensuring that users experience a proper level of challenge. The role of challenge in promoting intrinsic motivation is not limited to games, but has been noted by motivation researchers as relevant to all learning activities (Johnson, Vilhjalmsson, Marsella, 2005).
- Fish tanks and sandboxes – Some games provide smaller versions of the real game, where gameplay complexity is limited or versions of the game that have similar gameplay to the real game, but where there is less likelihood for things to go wrong - these help users to practice for the challenges of the full game (Johnson, Vilhjalmsson, Marsella, 2005).
- Story and character identification – For keeping user interest it is important that the player identifies with the story and the main character. (Johnson, Vilhjalmsson, Marsella, 2005).
- Fun and learning orientation - "Fun in the learning process creates relaxation and motivation. Relaxation enables learners to take things in more easily; motivation enables them to put forth effort without resentment. Given this, it certainly makes sense that fun and learning should go hand in hand," says Prensky (2003).

Another essential characteristic of serious game is interaction. The game environment should allow flexible interaction and different methods of interaction for the users. Interaction is enhances learning and for the game designer it helps to get feedback from the players (Whitton, 2010).

1.3 Gamification

The term gamification was first used in 2008 and was adopted widely in 2010 (Deterding et. al., 2011). According to Zichermann (2011) gamification is the process of using game thinking and game mechanics to solve problems and engage users. Helgason (2010) says gamification is the adoption of game technology and game design methods outside of the games industry. According to Kapp (2012) gamification is simply the use of game mechanics to make learning and instruction more fun.

1.3.1 What Gamification is and What is it not?

Serious games and gamification terms can be overlapping, but at the same time they are not synonyms. Similar to serious games, gamification uses elements of games for purposes other than their normal expected use as part of an entertainment game but serious game describes the design of full-fledged games, gamified applications merely incorporate elements of games (Deterding et. al. 2011). Kruse (2012) says also that when it comes to learning events, we need to understand that, while we can benefit from the thoughtful application of gamification techniques, not every learning activity has to be a fully-fledged game.

Kapp (2012) points out that the foundation upon which gamification should be built consists of the following elements of games: engagement, interactivity, storytelling, visualization of characters and problem solving. He defines gamification as using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems. In addition to defining what gamification is, Kapp (2012) also brings out the misconceptions of the term and describes what gamification is not.

Here are some of the examples gamification is not:

- Badges, points and rewards – these are certainly parts of gamification, but they should not be the only game characteristic used. Gamified activity should involve more game elements to take the engagement and learning to the next level.
- Trivialization of learning – gamification should not cheapen the real learning. Gamified learning can also be and often is difficult and challenging.
- New – the elements of gamification have been used long before in military, education etc. than the term gamification was first used.
- Perfect for every learning situation – gamification is not a solution for every learning process. It is important to approach the gamification of content and learning carefully and methodically.
- Easy to create – it takes time and a lot of effort to develop the right methods, theme and goal setting.

Nicholson (2012) introduces the term meaningful gamification. Meaningful gamification focuses on introducing elements of play instead of elements of scoring. He says that rather than using merely the point system of games, meaningful gamification encourages a deeper interaction of game mechanisms into non-game contexts.

1.3.2 Examples of Gamification

Since gamification is relatively new concept, many examples that have been brought out in the previous researches involve the locative mobile application Foursquare. Foursquare is a check-in app that indicates whether your friends are nearby once you checked in. Foursquare fills in the engagement gap, progression, and the social elements by offering points, badges and other rewards. With such modification, the user base of Foursquare grew to around 20 million users within a short span of time (Sidharan, Hrishikesh, Raj, 2012). At the same time Kapp (2012) discusses, whether Foursquare is a game or a gamified activity – is Foursquare being played or used? The boundaries are quite blurry.

In addition to adding gamification elements to digital activities, the gamification methodologies have actually been used long before digital games even existed. Military has been using war-games, simulations and goal-driven experiences for centuries the same for teaching professionals who have been adding game-like techniques to enhance learning process (Kapp 2012).

Often gamification is used to solve some kind of problems. For example Sridharan, et.al. (2012) describe a case study of gamification in a work environment of Microsoft when it was needed to test Windows 7 operation system in 36 languages. By using their multinational employees, Microsoft launched a Windows Language Quality Game. Microsoft employees from all over the world were encouraged to play and use their native language to help to detect language defects in the system. Points were awarded to the players and the peers were able to see their cohorts score and the number of defects logged. The game was a success, total amount of players was over 4600 that reported altogether over 6700 language defects of the system.

Although several examples can be found about using gamification in problem solving context, but much less examples can be found in the educational field. In 2011, Temple University Fox School of Business news article wrote about a Social Media Innovation course that used Quests and Leaderboard to motivate the students. “In addition to learning about fundamental concepts related to social media topics, students complete hands-on tasks. Students earn Quest Points for tasks, such as creating online animations, writing blog posts and promoting their blogs. The more online traffic they generate, the more points they earn.” (Johnson, 2011) The professor of the course Steven L. Johnson (2011) also added “Lots of social media sites incorporate elements from games, like points, levels and badges. We’re

doing the same thing here and having a lot of fun while learning.” These kinds of uses of gamification in higher education have a lot of potential in engaging the students if the gamification elements are implemented in the right way.

This thesis provides another example and further knowledge to the field of using gamification in education that can be used in the following studies.

1.4 Motivation of Playing

Nicholson (2012) said that underlying the concept of gamification is motivation. Motivation can be defined as internal or external. He goes on by saying that once gamification is used to provide external motivation, the user's internal motivation decreases, therefore once the external rewards such as points or badges are taken away, the player loses interest of the game. Thus it can be said that more important is to focus on the internal motivation that keeps the player engaged despite of external motivators. According to Sheldon (2012) if the student is internally motivated, it means that he studies because he wants to and he realizes the importance of studying, therefore it is important for the teacher to help to generate the internal motivation in a student.

On the other hand Reiss (2005) argues that intrinsic motivation does not exist. “There is no reason that money can't be an effective motivator, or that grades can't motivate students in school,” he said. “It's all a matter of individual differences. Different people are motivated in different ways.” Reiss does not agree, that motivation is placed in only two categories (external and internal) instead he says that there are different desires that motivate people.

Playing is often something that engages the player so much that he forgets about the world surrounding him, time seems to be flying by and the process and reaching the goals of the game seems so pleasurable that it is hard to quit. Games and other pleasurable activities make the user go in the flow (Nakamura, Csíkszentmihályi, 2002). Johan Huizinga (1950) defined game playing as a free activity standing quite consciously outside ”ordinary” life as being ”not serious”, but at the same time absorbing the player intensely and utterly.

1.4.1 Concept of Flow

The origin of the concept of flow was first described by Mihály Csíkszentmihályi, who studied the motivation behind creative processes in 1960s and was fascinated by the fact that the painter was so absorbed in the process of painting that he did not pay attention to any external factors, such as hunger or discomfort – he was "in flow" (Nakamura, Csíkszentmihályi, 2002).

Based on their studies, Nakamura and Csíkszentmihályi (2002) discovered that the concept of "being in flow" consists of the combination of the six following experiences:

- intense and focused concentration on the present moment
- merging of action and awareness
- a loss of reflective self-consciousness
- a sense of personal control or agency over the situation or activity
- a distortion of temporal experience, one's subjective experience of time is altered
- experience of the activity as intrinsically rewarding, also referred to as autotelic experience

Flow is a concept more closely looked at in the context of sports or creative processes, but it is something that every human being can relate to. For example when being engaged to something so much that one forgets to eat or sleep (Chen, 2007).

1.4.2 Gameflow

The concept of flow also emerges while playing a good game. According to Prensky (2003), one of the foremost characteristics of good games is good gameplay that engages the user, keeps him motivated to continue and puts the player in a psychological state of flow (Johnson, Vilhjalmsson, Marsella, 2005).

Sweetser and Wyeth (2005) suggest a new model for the concept of flow – GameFlow – that consists of eight elements – concentration, challenge, skills, control, clear goals, feedback, immersion, and social interaction. Each element includes a set of criteria for achieving enjoyment in games (Sweetser and Wyeth, 2005):

- Concentration - ability to concentrate on the task

- Challenge Player Skills - perceived skills should match challenges and both must exceed a certain threshold
- Control - allowed to exercise a sense of control over actions
- Clear goals - the task has clear goals
- Feedback - the task provides immediate feedback
- Immersion - deep but effortless involvement, reduced concern for self and sense of time
- Social Interaction

All these elements consist of separate criteria that in combination create the feeling of enjoyment while playing a game (Sweetser and Wyeth, 2005).

Chen (2007) describes the zone in which the flow becomes apparent. He says that in order to design a game that is engaging for the audience, the game designer must combine the components of flow to find the right balance between the users feelings of boredom and anxiety for the zone of the flow (Chen, 2007).

If the activity is not very challenging for the player, he quickly loses interest in the game. The same happens when the challenge is too complex and the player is not able to overcome it. Therefore the game must keep the player's experience in the Flow Zone – that is in between these feelings to continue being intriguing for the player (Chen, 2007).

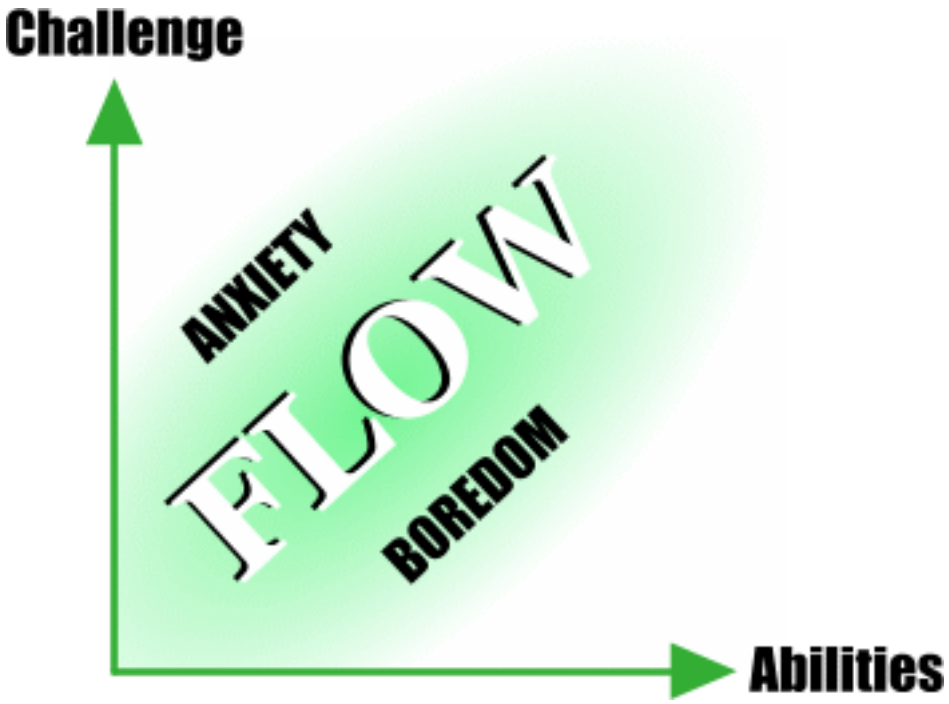

Figure 2 Flow Zone

Chen (2007) says that to keep the user in the flow zone uninterrupted, the game must offer different choices inside the game that allow the user to decide the way to go and enjoy the flow as he wishes.

1.4.3 Achieving Gameflow

Sweetser and Wyath (2005) mapped the main elements of game with the elements of flow in order to see how the game should be designed and what criteria should be taken into account to increase player enjoyment in the games and make the users go into the flow.

Game element	**Flow criteria**	**Criteria for Player Enjoyment in the Game**
The Game	A task that can be completed	The game itself
Concentration	Ability to concentrate on the task	Games should require concentration and the player should be able to concentrate on the game
Challenge Player Skills	Perceived skills should match challenges and both must exceed a certain threshold	Games should be sufficiently challenging and match the player's skill level

Control	Allowed to exercise a sense of control over actions	Players should feel a sense of control over their actions in the game
Clear goals	The task has clear goals	Games should provide the player with clear goals at appropriate times
Feedback	The task provides immediate feedback	Players must receive appropriate feedback at appropriate times
Immersion	Deep but effortless involvement, reduced concern for self and sense of time	Players should experience deep but effortless involvement in the game
Social Interaction	social interaction does not map to the elements of flow, but is highly featured in the literature on user-experience in games	Games should support and create opportunities for social interaction

Table 2 Mapping the Elements of Game with the Elements of Flow

Sweetser and Wyath (2005) analyzed two games according to the previous criteria and found that:

- Concentration is manifest through detailed worlds, units, and buildings as well as via compelling narrative in the campaign, good automation, simple gameplay and interface, and numerous tasks and objects to monitor;
- Challenge comes from the difficulty of the opponent, difficulty settings, mission variation, increasing difficulty in the campaign, mastering a new race or faction, and balanced units and races;
- Player skills are developed with the aid of descriptive tool tips, online help, an optional tutorial that fits with the story, a simple and well-designed interface, visual and auditory cues, a campaign that gradually introduces the various races, units and buildings, rewards of more skill, abilities or items, and rewards of cut scenes and story;
- Players are given more control through path finding, attitude adjustment, unit formations, an easily controlled interface, a polished game with no bugs, and unique races that allow different play styles and strategies;
- Clear goals are presented through an introduction that provides background, motivation, and overriding goals, in-game cut-scenes that present goals and further the story, as well as clear and specific mission objectives;

- Feedback involves notifying the player of completion or failure of missions, keeping a log of mission goals, objectives, and status, providing a score and summary at the end of the mission, as well as visual and auditory feedback on actions, tasks, and events;
- Immersion is achieved through concentration (i.e. tasks, monitoring, visual and auditory stimuli), feeling a connection to heroes, units, and the story, feeling excited by the pace of the game and no periods where the player is inactive or waiting;
- Social interaction comes in the form of a variety of multiplayer modes, rankings, being able to play with or against other players, interact with them, and the ability to create and share game content.

In their research, Sweetser and Wyath (2005) used the criteria to evaluate computer based games, but the generally the same criteria also fits with non-computer games. They analyzed the games from their own point of view and gave points for each criterium only as they perceived it. Later they found that their research would require also player-testing to get more accurate results. This research in the other hand uses mainly player-testing to evaluate the game enjoyment and flow of the course, which also adds new knowledge to the method and criteria used for the game enjoyment and flow evaluation.

1.5 Use of Games in Higher Education Learning Process

Games are ideal learning environment with their built-in permission to fail, encouragement of out-of-box thinking, and sense of control (Kapp, 2012). Combining games, motivation and learning seems to be an effective way to make studying effortless and fun. But learning environment opposed to entertainment games should meet different requirements to achieve the goal of obtaining knowledge in larger amounts. Still "games can make learning so much fun that they mask the large amount of learning required to play them successfully" (Whitton, 2010).

Paras and Bizzocci (2005) identify seven basic requirements for learning environments by Donald Norman:

- Provide a high intensity of interaction and feedback.
- Have specific goals and established procedures.

- Motivate.
- Provide a continual feeling of challenge that is neither so difficult as to create a sense of hopelessness and frustration, nor so easy as to produce boredom.
- Provide a sense of direct engagement, producing the feeling of directly experiencing the environment, directly working on the task.
- Provide appropriate tools that fit the user and task so well that they aid and do not distract.
- Avoid distractions and disruptions that intervene and destroy the subjective experience.

Paras and Bizzocchi (2005) also emphasize that for educational purposes rather than entertainment purposes it is important that the user reflects the learning process – it is something that he does not have to do in the case of entertainment games. "Games can act as effective learning environments by integrating reflection into the process of play, producing an endogenous learning experience that is intrinsically motivating," (Paras and Bizzocchi, 2005).

Epper, Derryberry and Jackson (2012) believe that game-based learning is becoming more and more prevalent in today's education. They suggest six trends that will drive the adoption of game-based learning:

- Student expectations: young people today have grow up with technology and computer games, which makes them aware of the different possibilities of games, this includes educational purposes

- Integration of games and simulations: digital simulations help the students to practice real-life situations, get them to know the conditions and practice skills.

- Data analytics: Games and playing as learning tools generate large amounts of data for the instructors. In addition to students failing or succeeding, there is also data for example about teamwork, learning styles, collaboration preferences, etc that should be analyzed and used to provide new insight.

- Badges for learning: this involves giving students credit for their accomplishments; it is a game like alternative for traditional assessment methods.

- Mobile devices: mobile devices with constant connection to the Internet offer many services like locative mobile applications, augmented reality or QR codes that can enhance game-based learning experience.

- Increasing prevalence of social media: social media and social games are playing more important role in education and learning processes as well as other aspects of modern lives.

As gamification in higher education is becoming more and more prevalent, there has not been much research on how to study the students perception of gamified courses. By taking into account the previous literature review, the next part of the thesis goes on with explaining the essence and methodology of the research to provide new knowledge to the field of gamification in higher education.

2 Research

This thesis concentrates on a case of Game Interactions course in Tallinn University, carried out in spring semester of 2013. The course was designed as a game and used game elements in the process.

The research focused on the flow aspects of the course and asked the following research questions:

- Did the course manage to engage the users enough to fulfill the criteria for generating gameflow?
- What were the instructor's (game designer's) expectations for using game elements in the course and did they come true?
- What could be the future suggestions for designing courses with gamification elements?

These questions give the framework for the research of this thesis and intend to provide results that could be useful for the future research of using game elements in higher education courses and designing more effective gamified courses.

2.1 About the Game Interactions Course

The Game Interactions course lasted from January 25th to April 12th, 2013. There were 19 students taking part of the course that were divided into five groups for developing their own computer game.

The course was designed as a game, which means that it used game elements in the process in order to engage the students. The game elements that were used in the course included avatars as the characters the students were playing, competition, goals, rewarding points and challenges. According to the Game Interactions course program (2013), during this course players (students):

1. Competed with opponents – the course used quizzes to test the students' knowledge, there were also points students could earn when answering to the teacher's and other students' questions.

2. Completed quests – for each topic, students needed to do some research and be prepared to present their findings in class.
3. Did Crafts – students prepared documents, like essays and short papers for classes, for final presentation they were planned to present the prototype of their game.

The ultimate quest was to defeat Big Boss (exam) with designing and selling the idea of a new game. To achieve this goal players (students) were equipped with needed knowledge (principles of game play theory, game design and implementation). For each assignment they were given experience points as a reward that scored in total as their final grade. All the course materials, assignments and the score boards were uploaded to the course online environment in iCampus.

As the survey of this research was conducted taking into account the criteria for game enjoyment and game flow by Sweetser and Wyath (2005), it is important to evaluate, which activities and elements of the course answered to the requirements of the game enjoyment criteria.

Criteria	**Course elements**
Concentration	Course provided opportunities to work with different tasks, there were lectures and seminars, an online environment, individual and group assignments and home assignments.
Challenge Player Skills	The tasks given were different in the sense of difficulty as well as skills needed for perform the tasks. Group assignments allowed the students to divide the tasks according to the skills of the members.
Control	Students were able to choose, how they would want to receive their score. They could concentrate only on the main tasks or get extra points for performing several smaller and easier tasks.
Clear goals	The goals of each assignment and the main goal of the course were explained during the course and uploaded on the course online environment iCampus, where they were available at all times.
Feedback	The teacher gave feedback after each assignment via email, in lectures and on scoreboard that was available in iCampus.
Immersion	Course tried to provide an environment for immersion to take effect by using the game elements.
Social Interaction	Social interaction opportunities were provided by seminars, group work, competition and presentations.

Table 3 Game Enjoyment elements and Game Interaction Course Elements

As the game enjoyment criteria were not taken into account while designing the Game Interactions course, the course elements brought out in Table 3 were only the observations of the author. The real aim of the course instructor for using game elements in Game Interaction course will be studied with an interview with the course instructor.

2.2 Methodology

The research was conducted as a case study and two different methods were used for data collection: an online survey and a semi-structured interview.

The students taking part of the course participated in an online survey giving feedback on the course and its process. The questionnaire was available from April 12th to 19th, 2013 in Google Docs environment. Out of 19 students that participated in the Game Interactions course, 15 respondents were analyzed that gave feedback through the online questionnaire.

Survey was considered as the best method for evaluating the students' feedback on the gamified course. The answers given by the students could be considered both quantitative and qualitative, as the first part of each question was formulated as a multiple choice question and the other part asked for voluntary explanation to their answer. Research questions were conducted by using the game enjoyment and flow evaluation method by Sweetser and Wyath (2005). Questions were modified by the author to meet the needs of evaluating computer based as well as non-computer based gamified courses.

The second part of the research involved a semi-structured interview with the course instructor who in this case was viewed also as a game designer. The interview took place on April 29th, 2013. The interview method was chosen in addition to the survey method to analyze the case more in depth and from different points of view. Interview gave an insight to the aim of using game elements in the course, to the expected results and to final evaluation from the instructors side.

2.2.1 Survey Questions

The online questionnaire was conducted in the Google Docs environment taking into account the game flow evaluation method by Sweetser and Wyath (2005). The questions were

categorized to evaluate all the elements that are needed to create enjoyment and flow in games.

Element	Question
Concentration - Games should require concentration and the player should be able to concentrate on the game	1. Did the course provide enough stimuli that it was worth attending? 2. Did you manage to keep your focus on the course and its tasks the whole time? 3. Did you sometimes feel burdened with tasks that did not seem important?
Challenge and **Player Skills** - Games should be sufficiently challenging and match the player's skill level and support player skill development and mastery	4. Were the tasks suitable for your skills? 5. Did the tasks get more challenging during the progress of the course? 6. Did you feel that your skills increased during the progress of the course?
Control - Players should feel a sense of control over their actions in the game	7. Were the instructions and scoring system of the course clear to you? 8. Did you feel that you were able to control how many points you got for the course? 9. Did the scoring system offer appropriate rewards for the tasks completed?
Clear Goals - Games should provide the player with clear goals at appropriate times	10. Were you aware of the goals you needed to achieve during and by the end of the course?
Feedback - Players must receive appropriate feedback at appropriate times	11. Did you receive immediate feedback about your tasks? 12. Were you always aware about your score in the course?
Immersion - Players should experience deep but effortless involvement in the game	13. Did you sometimes feel that the tasks given were so engaging they involved you emotionally?
Social Interaction - Games should support and create opportunities for social interaction	14. Did you feel the competition between the fellow teams? 15. Did you and your team member(s)

	cooperate well?

Table 4 Survey Questions

2.2.2 Interview Questions

Interview questions were based on the semi-structured nterview with the course instructor took place in person on April 29th, 2013 and consisted of the following nine questions:

1. What was the aim of designing the Game Interactions course as a game?
2. What kind of literature or previous materials did you use to design the course as a game?
3. What kind of elements did you use to help to generate the game feeling in the course?
4. How did you expect that using game elements would affect the students' learning process?
5. How did the students accept the game elements in the course?
6. Which game elements met your expectations for the course the best and which not so well? Please explain.
7. What would you change in the next year's course?
8. What are your suggestions for designing courses with game elements?
9. Was there anything else that you learned in the process of the course that was not asked?

The aim of the interview was to get an overview of the course instructor's goals for the course and the knowledge he got from the experience. Therefore the interview was conducted as semi-structured, to gain additional knowledge and ask additional questions if needed.

2.3 Results of the Survey

The following chapter will give an overview of the results of the survey conducted among the students of Computer Interaction course. The results of the survey are divided into seven chapters according to the game element categories.

2.3.1 Concentration

Sweetser and Wyath (2005) say, that in order to be enjoyable, the game has to require concentration. The questions of the survey that were asked about concentration were the following:

- Did the course provide enough stimuli that it was worth attending?
- Did you manage to keep your focus on the course and its tasks the whole time?
- Did you sometimes feel burdened with tasks that did not seem important?

The quantitative part (see Figure 3) of the answers showed that the course did manage to provide enough stimuli and hold the focus of the students, however some students did find some tasks rather burdening.

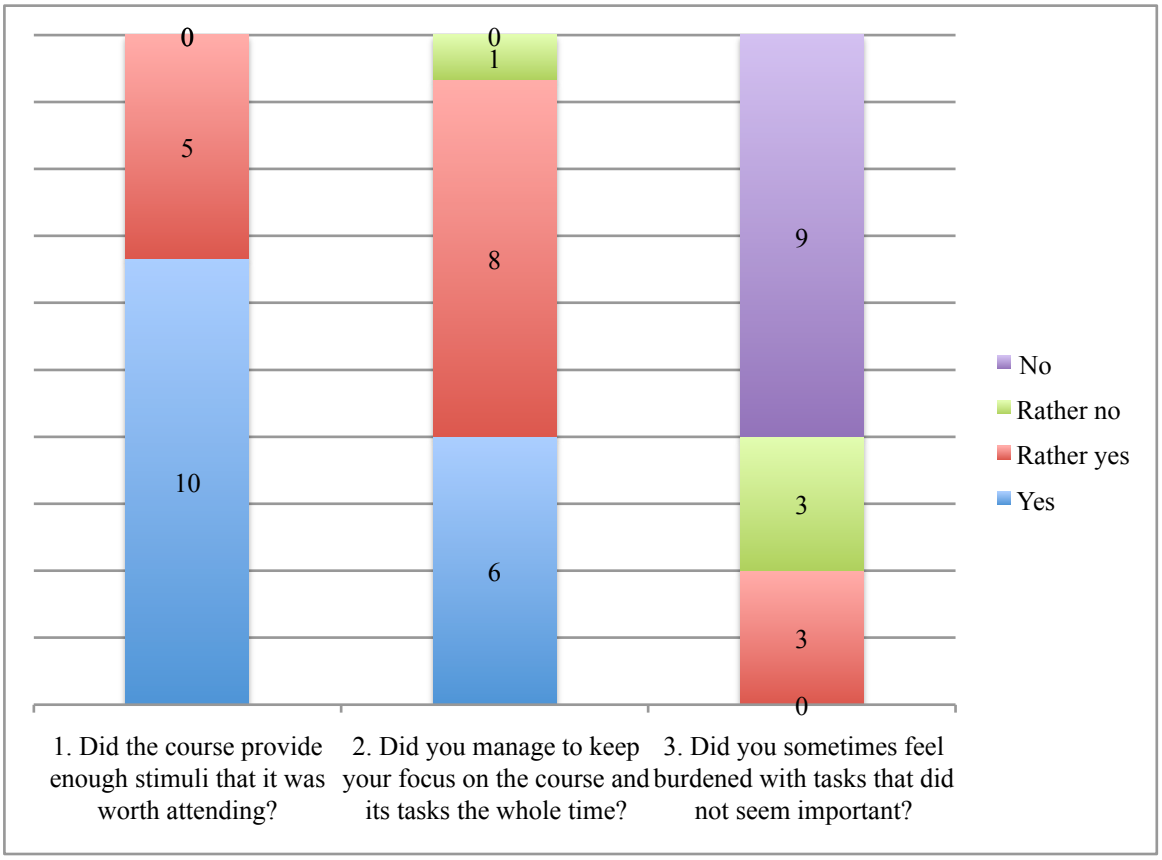

Figure 3 Concentration

The reasons why the tasks were considered burdening differed. One respondent claimed that there were too many small tasks that could have been concentrated into bigger assignments. Other respondent said that the tasks given for homework were too time consuming. The somewhat controversial answers to the third question could prove professor Reiss's (2005)

theory that different people are motivated in different ways and that also people feel burdened by different things.

Even though most of the respondents said that they were able to keep focus on the course well or rather well, the explanations show that there were some problems that prevented them from being fully focused on the course. One respondent said that he found some of the tasks somewhat dull, which made him lose focus at some point. Another respondent said that it was hard to remember to log in to the course online environment in iCampus to look for home assignments since other courses use different online environments that also need logging in. It could be understood that the student felt burdened by the logging in activity that made it harder for him to keep focus on the course. This shows that the concentration scattered when the course was not able to maintain students attention.

2.3.2 Challenge and Player Skills

Sweetser and Wyath (2005) said that games should be sufficiently challenging, match the player's skill level, vary the level of difficulty and keep an appropriate pace. For finding out if the course gave the students enough challenge and supported player skill development, the author generated the following three questions:

- Were the tasks suitable for your skills?
- Did the tasks get more challenging during the progress of the course?
- Did you feel that your skills increased during the progress of the course?

The respondents found the tasks rather suitable for their skills and majority of them felt that their skills increased in the progress of the course. But the opinions were different when asked if the tasks got more challenging during the progress of the course (Figure 4).

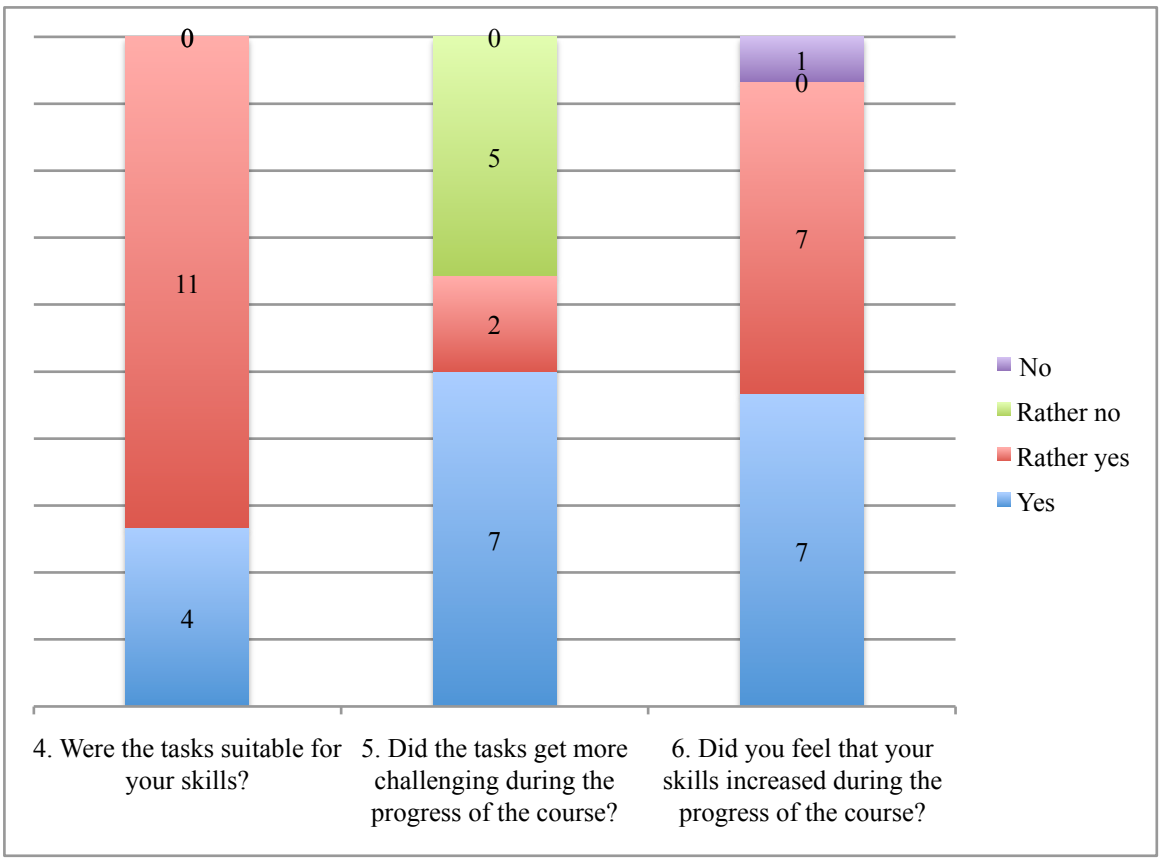

Figure 4 Challenge and Player Skills

The respondents' answers showed that as there was a possibility to divide tasks between the team member according to the skills of each person, they found the tasks to be suitable for their skills. It was also possible to choose tasks in the team that would demand acquiring new skills. For example one respondent said that "Well I found my self working a lot with Photoshop which I usually don't do". This also means that the course provided different levels of challenge for different students.

The Sweetser and Wyath (2005) criteria for player enjoyment in games say that the level on challenge should increase as the game progresses. In the case of this course most of the students agreed that the tasks of the course got more challenging as the course progressed. There were comments like:

- *"Every next task got harder"*
- *"Yes, there were things during the course that I had not thought about yet during the pre-production phase before."*

One of the respondent said that the tasks got harder as the team was involved, which shows that the social interaction element could also be a challenge for some students.

There were five respondents who rather did not see the increase of challenge level. One of the respondents said that the tasks were different as they involved different topics of the course, but one task was not more difficult than the other. Another respondent also said that as the tasks appeared naturally they were not very hard.

The game enjoyment criteria also say that games should provide new challenges at an appropriate pace. Even though questions about the pace of the new tasks were not directly asked in this survey, one of the respondents mentioned that although one of the assignments took more time to do, two weeks interval between courses was enough to finish the home assignments.

Even though there were different opinions about whether the tasks got more challenging during the progress of the course, almost all students felt that their personal skills did develop during that progress. Several respondents mentioned certain topics of the course that helped them to increase their pervious skills, one of the respondents said that he was able to develop his skills of team leading during the course and another respondent said that the course was helpful for his personal research interest.

2.3.3 Control

Sweetser and Wyath (2005) say that in order experience flow, players must be allowed to exercise a sense of control over their actions. It means that they should understand how they could affect the course of the game, they should have opportunities to choose different paths to reach the goal and they should feel to be in control of what happens next.

The following questions were asked from the students to find out, whether they feel that they were able to control their result in the course:

- Were the instructions and scoring system of the course clear to you?
- Did you feel that you were able to control how many points you got for the course?
- Did the scoring system offer appropriate rewards for the tasks completed?

As can be seen from the results, the students answers yes or rather yes to all of the questions about understanding their opportunities in the game and being in control of their results (Figure 5).

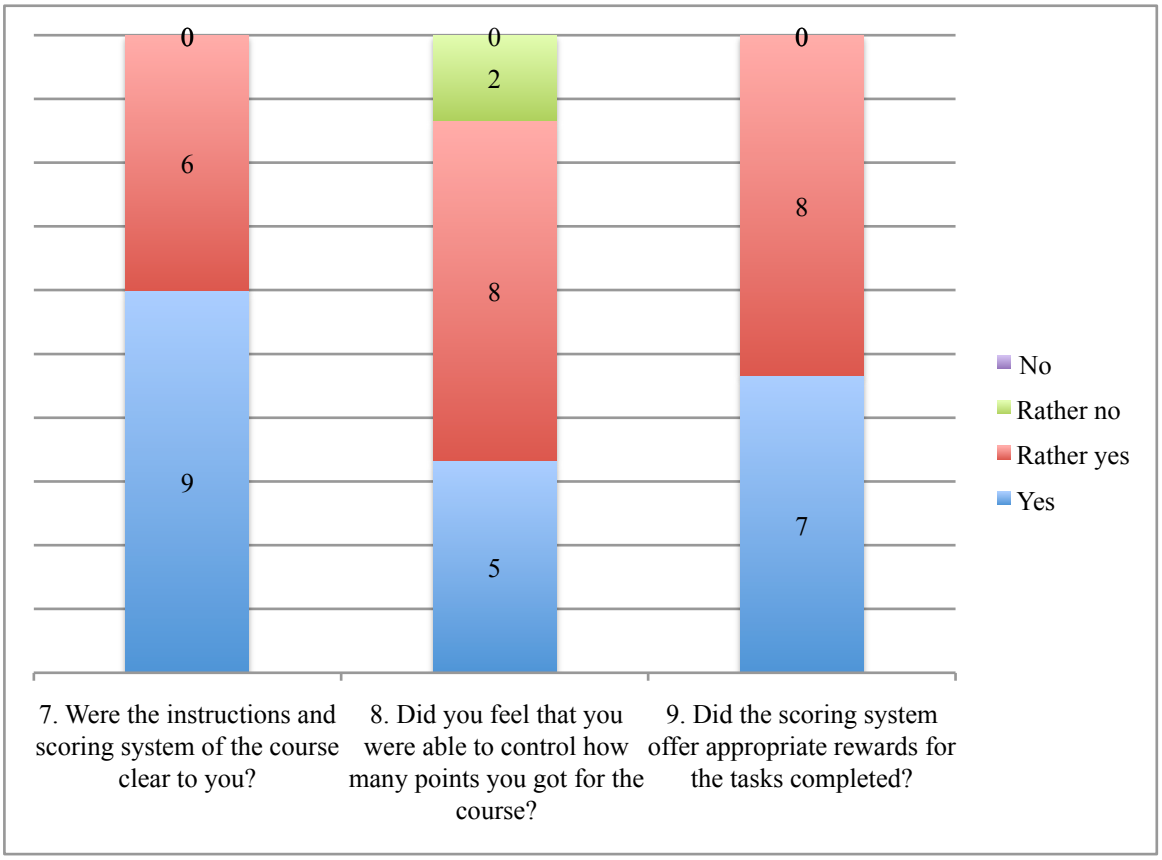

Figure 5 Control

There seemed to be some misunderstandings in the scoring system for some students, but it got more clear for them during the course. One respondent said that the explanation of the scoring system took time away from the course itself, which shows that he was not very motivated by the scoring system. If asked were the scoring system clear to the students, even when the answers were "rather yes" some of the comments were:

- *"This is a tricky part since there were random points to earn that we could not control."*
- *"It's not a complete yes because the scores were not openly available at all times, but in the end it didn't make a difference."*

It can be said that the scoring system could be improved to provide more clear understanding, be available for the students during the course at all times.

The respondents found the scoring system to be fair. One respondent said, that it is always motivating for the gamers to receive extra points. Another respondent found the scoring system complex and fair. One of the respondents answered that "I cannot really analyze the scoring system theoretically, but if I didn't put much extra effort and just did the standard tasks as well as I could and will probably get an A, then obviously the system works fine =)". It shows that he had a choice, whether to make a great effort on the main assignments to reach the goal or not spend so much time on the main assignments and reach the goal by getting points from the extra assignments. He chose the first option. The opportunity of choosing different paths to reach the goal answers to the game enjoyment criteria by Sweetser and Wyath (2005).

2.3.4 Clear Goals

Games should provide players with clear goals at appropriate times and the goals must be clear (Sweetser and Wyath, 2005). To evaluate if the students were aware of the goals of the course, the following question was asked (Figure 6):

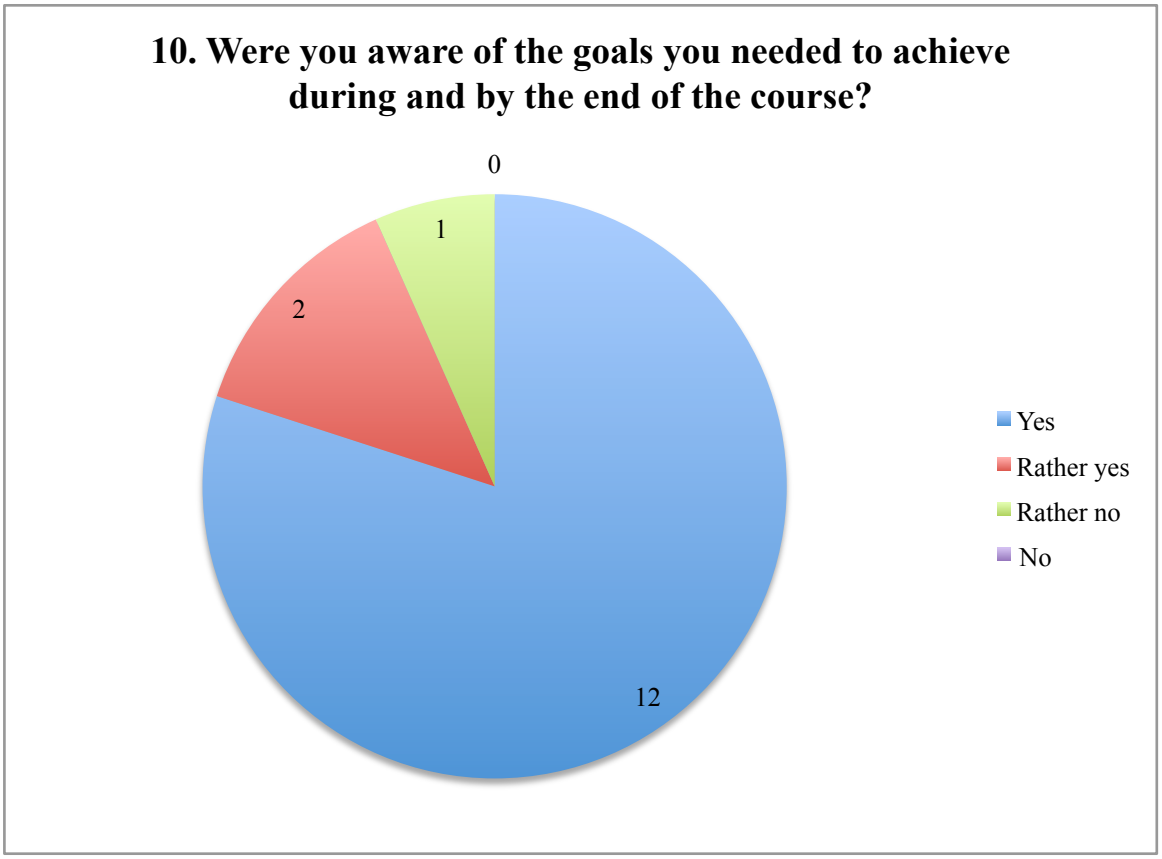

Figure 6 Goals

All of the goals that the students needed to achieve were uploaded in the course online environment in iCampus, where the students could read them and complete the tasks afterwards. This was also mentioned by two of the respondents, that the goals were well explained on iCampus.

One of the respondents also commented that he achieved also his personal goal for the course of being able to develop games in the future if needed. Developing personal goals during the game shows that the student is internally motivated. According to Sheldon (2012) if the student is internally motivated, it means that he studies because he wants to and he realizes the importance of studying, which means that the also course achieved its goal for this particular student.

2.3.5 Feedback

According to Sweetser and Wyath (2005) players must receive frequent feedback for players to determine distance and progress towards objectives. Therefore they should be aware of their score and status in the game. The questions for analyzing the students' satisfactory about the feedback given in Game Interactions course were the following:

- Did you receive immediate feedback about your tasks?
- Were you always aware about your score in the course?

The feedback was given to the students via iCampus environment as well as email from the teacher. Figure 7 shows that students were satisfied with the feedback about their tasks but half of the users was not sure about their score during the course.

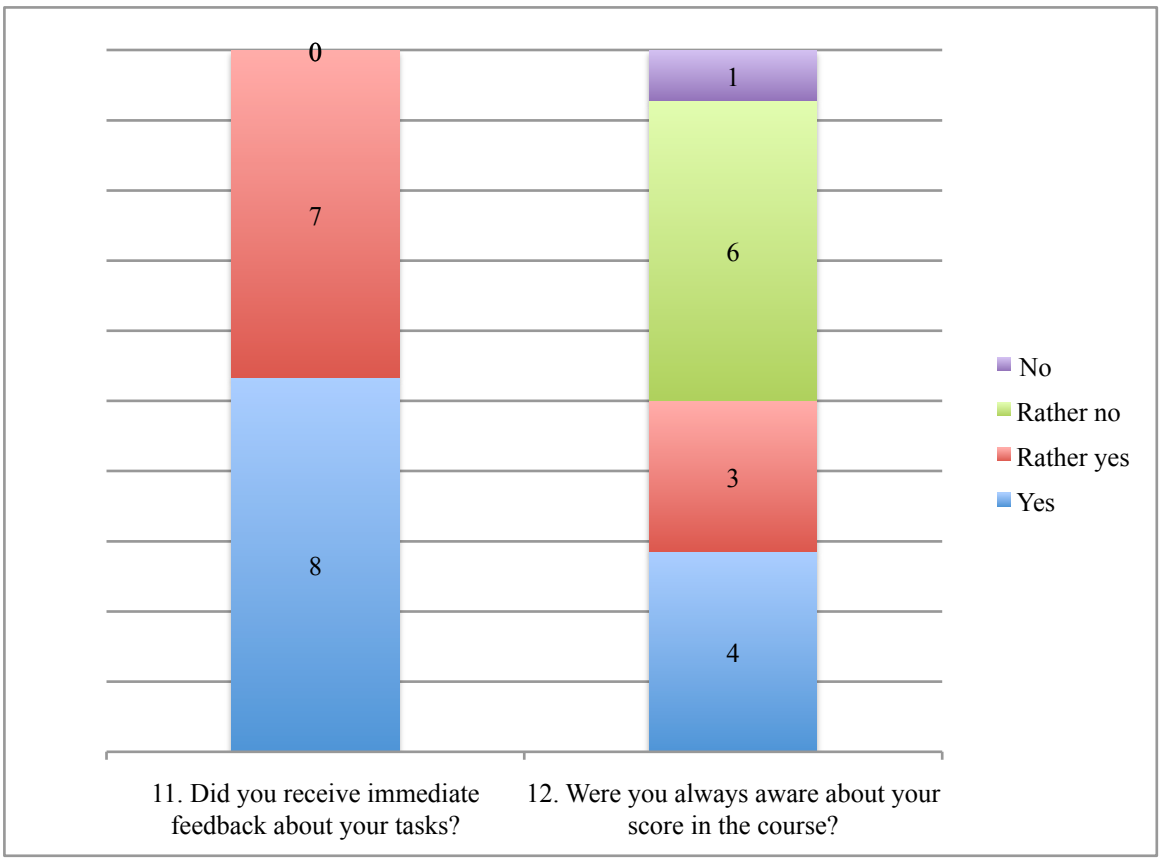

Figure 7 Feedback

The main reason why the students were not always aware about their score was the fact that they were not really interested in it. Few respondents commented:

- *"I think I lost track after the second class when the scores were shown on the wall."*
- *"I was not really trying to know the score all the time. Did all the tasks - and expected the score to be more or less satisfactory. I didn't feel the drive to compete with other people of the course, as I guess didn't others. So this is where the "gaming" part didn't really work"*
- *"It's not a complete yes because the scores were not openly available at all times, but in the end it didn't make a difference."*

The answers show that the scoring element was not so successful in creating the flow effect, as the students were not very motivated about knowing their score in the course.

2.3.6 Immersion

Immersion means that the players should experience deep but effortless involvement in a game which can result in loss of concern for self, everyday life and an altered sense of time

(Sweetser and Wyath, 2005). In the framework of this study, the students were asked if they sometimes felt as if the tasks given were so engaging they involved them emotionally, to know their level of immersion in the course.

Most of the students answered "yes" to this question, four respondents felt less engagement (Figure 8).

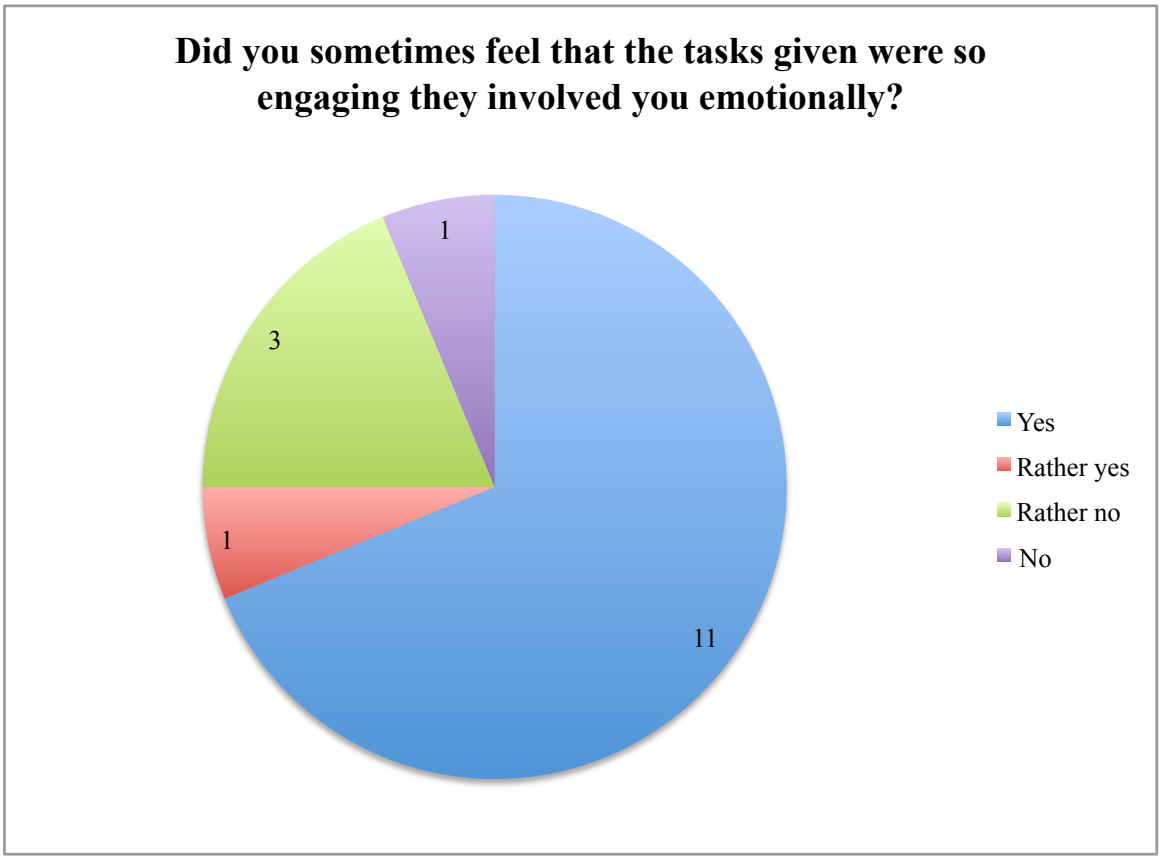

Figure 8 Immersion

The students who answered that they were not engaged into the course emotionally unfortunately did not give explanations to their answers. The respondents who claimed to be emotionally engaged in the course also provided somewhat emotional explanations:

- *"When describing my favorite game I felt like I could write a novel about it."*
- *"Because I made my real life tasks the tasks of the course. What I mean is that we work on a game idea that we are really going to produce."*
- *"Oh it got emotional all right with the team thing."*
- *"How happy we were when we finished the trailer!"*
- *"We were really engaged with making the final presentation and game idea just because we loved our project. We could get through with much less efforts (like*

without the game trailer, that took pretty much time to make), but just because the project was interesting, we did it for our own fun."

Based on these answers it could be said that the course managed to answer to the immersion criterion for some of the respondents. Other respondents who were not as engaged did not explain their answers at all.

Interesting fact is that the same respondents who did not explain their answer of being not engaged also did not provide explanations to other questions, which may show that they were only giving minimum effort in order to receive the needed extra points for the feedback questionnaire. Answering to the questionnaire was not compulsory for the students they only needed to answer it if they wanted to give feedback or for getting extra points. Hence they were either driven by internal or external motivation (Nicholson, 2012).

2.3.7 Social Interaction

To support social interaction, games should create opportunities for player competition, cooperation and connection (Sweetser and Wyath, 2005). The social interaction in the case of this course involved group work, competition element between the five teams and interaction during the course.

In order to evaluate the social interaction factor in Game Interactions course, the author asked the two following questions from the students:

- Did you feel the competition between the fellow teams?
- Did you and your team member(s) cooperate well?

Most of the respondents did not feel much competition between the fellow teams and they were satisfied with the cooperation inside their own team (Figure 9).

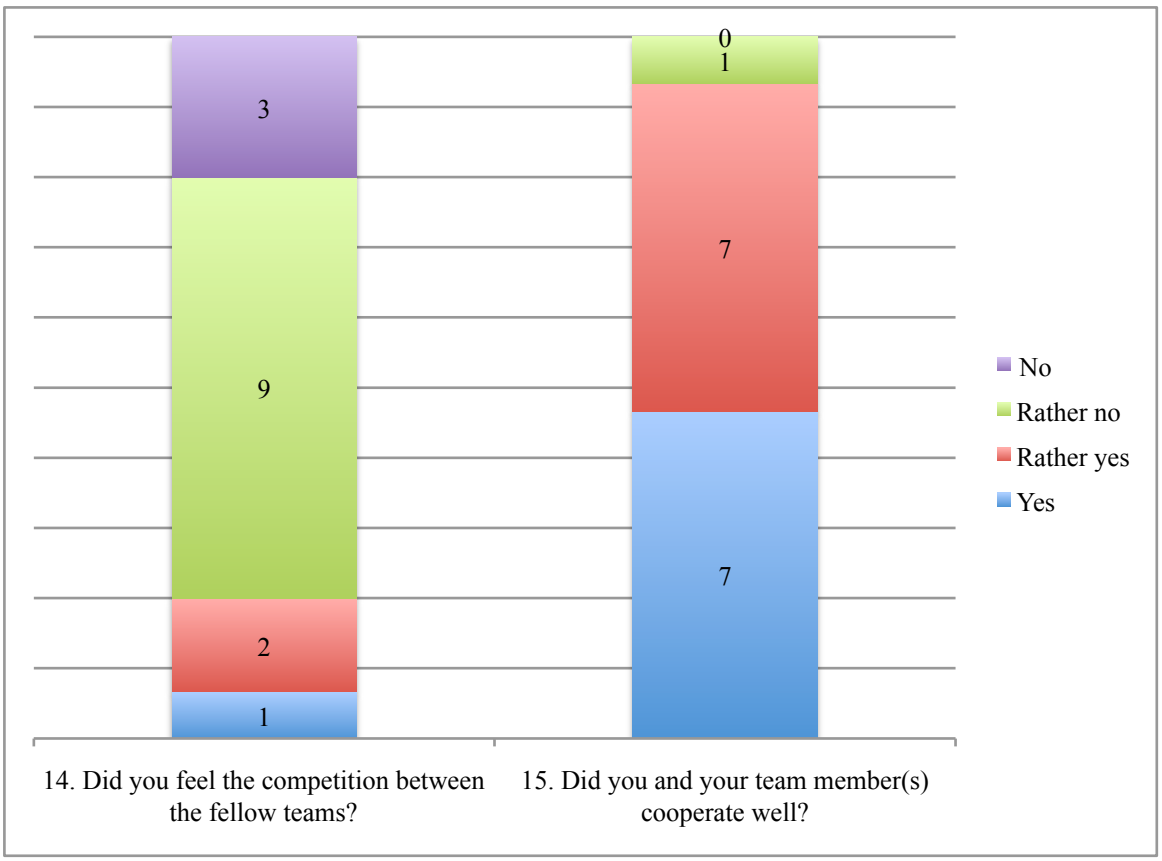

Figure 9 Social Interaction

One respondent who agreed that there was competition going on between the teams only commented that the competition was "a healthy one". Some respondents said that as they know each other and have been studying together for a while, they were rather supportive to one another than competitive.

Although what came out from two of the respondents was the fact that they were lacking the social interaction part for some reason:

- *"I had no indication of how far anyone was or what they were doing."*
- *"Since there was only one other person (from another team) I talked to outside the class and we weren't very competitive I don't think I felt the competition. But you could feel the competition present at last event."*

These answers show that maybe there could have been more opportunities or tasks for the students to increase the feeling of social interaction in the course. Although social interaction is not an element of flow, it is an important part of game enjoyment. People sometimes play games for social interaction even when they do not like the games they are playing (Sweetser

and Wyath, 2005). Therefore in order to increase the enjoyment, it is useful for the course instructor to provide more opportunities for social interaction in the game.

The team cooperation satisfaction varied according to teams. Some teams were able to divide the tasks between their members and get everything organized and working during the whole course. Others found it more difficult to get the cooperation working, mainly due to team members who were less motivated in doing the course work.

2.3.8 Conclusion of the Survey

Overall it could be said that the course did meet the requirements for creating game enjoyment and flow quite well. The next table will show the general results of the evaluation of the elements in the course and suggestions how could the course be improved.

Element	**Result and suggestions for improvement**
Concentration - Games should require concentration and the player should be able to concentrate on the game	The course provided enough stimuli and kept the students focus to have their attention and concentration. The tasks could be overviewed to provide different assignments for different students so that they could choose the tasks that they find more interesting and achieve the goals in their own way.
Challenge and **Player Skills** - Games should be sufficiently challenging and match the player's skill level and support player skill development and mastery	The students did feel that their skills increased during the course and the tasks suited these skills, but they rather did not feel that the tasks were getting more challenging during the course. There is room for improvement on designing the challenges for the next time. The tasks should get more challenging during the course to support students skill development.
Control - Players should feel a sense of control over their actions in the game	Students were aware of the scoring system and knew how to receive points. It was good that they had choices, which way to reach the goals. Students could choose to do only their main assignments or could increase their score even when their main assignments were not so well done.
Clear Goals - Games should	The goals were clearly stated on the course online

provide the player with clear goals at appropriate times	environment iCampus and explained during the classes. Students did not have trouble finding them.
Feedback - Players must receive appropriate feedback at appropriate times	Students were satisfied about the speed of feedback given to them via email and on the scoreboard. But they were not very interested in knowing their score during the course. Next time less effort could be put on the scoring system, since students were more interested in the content of the course and the process of group works and presentations.
Immersion - Players should experience deep but effortless involvement in the game	Most of the students claimed to be emotionally engaged in the course. They found the topics, course process and the challenges interesting. Those who were able to keep their concentration also were more engaged.
Social Interaction - Games should support and create opportunities for social interaction	Social interaction inside the teams worked rather well, apart from some exceptions. The competition level between the groups was not very high, since the groups did not make contact with each other very much. The students would have liked to get more time to do group works and it probably would have been good to have more contact with the other groups. It would have increased the competition level as well.

Table 5 Conclusion of the Survey

2.4 Results of the Interview

The research question concerning the interview with the course instructor was "What were the instructor's (game designer's) expectations for using game elements in the course and did they come true?" From the interview it can be understood that the course instructor was generally satisfied with the results of using game elements in the course.

The course instructor's main goal for using game elements in Game Interactions course was to make students feel as if they were not attending a course but playing a game. As the Game Interactions course was about designing games, his idea was to use the same elements the students learned in the class also a part of their course.

The first game element that the course used was game vocabulary. The course was called a game, students were players, who had their own avatars, home assignments were called missions and quests and the final presentation was called Big Boss fight. Another element that was implemented in the course was the scoring system – points and levels. As the instructor wanted to keep the scoring board publicly available online, there was a privacy issue that could have evolved. Which is why the avatars were useful, in addition to creating a playful environment they helped to create the anonymity for the students who did not want their grades to be public.

As the course instructor did not have previous experience about creating a course as a game, he used materials from available literature. He had read articles about gamification and game-based learning. One book that was a major influencer for designing the course was called The Multiplayer Classroom by Lee Sheldon. He modified some of the ideas from the book to design his course.

In the beginning of the course the Course instructor was concerned if it was acceptable for Master level students to start playing games instead of having lectures, like they are used to. The concept of the course was surprising for some of the students, but they got used to it and no one was against it. The students seemed to enjoy the process and did not care so much about the scoring. The same result also came out from the survey of the students. They were more absorbed by the topics and process then paying attention to the scoreboard.

There are some aspects that the instructor learned from the process that he would like to improve for the next year's Game Interactions course. The changes would be the following:

- The course/game will not concentrate so much on scoring and scoreboard but more on flow and how to create flow in the course.
- Start with easier tasks and make the challenges more difficult as the course progresses in order to use the increased knowledge of the students and keep them in flow.
- Try to use some other genre of the game instead of multiplayer game.
- Integrate flipped classroom strategy – instead of teacher giving lectures, the students could read the same materials at home, during the class, they would test their understanding in a quiz form and then have the rest of the class for discussions and team work – it would be time saving, more effective and fun for the students as well as for the teacher.

For other teachers who would like to integrate game elements into their course, course instructor suggested to start with adding some game elements into one class or one activity of the course. He said that running the whole course as a game can be risky – it takes much effort and energy to think everything through and still not be sure if it is going to succeed or not. But one thing he suggests for teachers to try is to do one class or one activity of the course as a game. "For example instead of running a test in a multiple question format, it would be nice to do a quiz, like Jeopardy for example. You activate students and you can have a nice discussion afterwards," he said. This is a method that he has used before and would like to use in his other classes as well.

When looking at the Charsky's (2010) list of game characteristics, the course involved all these five elements:

- Competition – students competed individually as well as in teams during the course
- Goals – the main goal of the course was to make it to the final presentations event, called Big Boss fight. There were also smaller goals that needed to be reached for each class.
- Rules – the course had a set of rules according to which the students knew the schedules, deadlines, were scored and graded by.
- Choice – in order to pass the course, student could choose, whether to gain their needed points from doing the main assignments as well as they could, or try to benefit more from the extra points that were given in addition to the main assignments
- Challenges – there were different challenges given for each course

Therefore it could be said that the course met the requirements of being a game.

Conclusion

This thesis has given an overview of using games and elements in higher education learning process. Game industry is growing rapidly, but using games in education is not very well spread yet. At the same time educators from all over the world are looking for ways to make learning processes more engaging for students, so that they would be internally motivated to study. Combining game elements with learning process has given some good results but it has not yet been studied thoroughly how do the game elements in the course increase the students' enjoyment of the studies and how to create the flow effect in the course as it appears during playing a good game.

The aim of this study is to learn how can game elements be integrated into the learning process of higher education students. The research is formulated as a case study that focuses on a course of Game Interactions that was designed as a game and used game elements in the course process. Starting from introducing the concept of games, serious games and gamification the thesis sets a context for understanding what is a game, what are its characteristics, how to differentiate serious games from entertaining games and what is gamification and how it can be implemented in different fields, including education.

The research is conducted in two parts. Firstly the online survey with the students of the Game Interactions course and second part is an interview with the course instructor. The author suggested three research questions. First question was: "Did the course manage to engage the users enough to fulfill the criteria for generating gameflow?" According to the survey answers and based on the gameflow evaluation criteria by Sweetser and Wyath (2005) the course was overall successful in creating gameflow. The students were concentrated on the course, they found the topics, process and tasks of the course interesting and that made it easier for them to get emotionally involved in the course. They were not so interested about their score in the course but rather got involved in the process and challenges of the course.

The second research question was "What were the instructor's (game designer's) expectations for using game elements in the course and did they come true?" The course instructor and the designer of the game concept of the course expected that that students would rather feel that they are not in a typical lecture but were playing a game and having fun. He also expected that this kind of course arrangement would make them more engaged and motivated in participating in the course. The results of the survey show that the students

got engaged and were emotionally involved in achieving the goals of the course. But it cannot be said exactly, whether it was because of using game elements in the course or because the course topics and content were simply so interesting that it would have engaged the students even without the game elements.

The third research question was "What could be the future suggestions for designing courses with gamification elements?" Based on the students' survey and course instructor's interview there are suggestions that could be implemented on a similar course as Game Interactions or in any higher education course.

Based on Game Interactions course case study the suggestions for designing a course with game elements could be the following:

- Before designing the whole course as a game, it is useful to start as planning some of the activities in class as games. For example playful quizzes instead of traditional tests.
- It is good to have variety of tasks with different challenge levels for different students, so that they could control which assignments to do for reaching the goal. This way they are not burdened with tasks that seem unimportant to them and are able to keep their concentration.
- Students should be given gradually more challenging tasks to support their developing skills during the course. It helps them to develop their knowledge and skills and keep their interest.
- Spending more time on social interaction instead of traditional lecture-based classes - having more group works and open discussions during class helps to increase the social engagement and also the competition level.
- Scoreboard is nice to have but not so important for the students.

In addition the author suggests some topics for further research that would support the knowledge of using gamification in higher education.

- How to measure the effectiveness of the flow effect in higher education learning process?
- In which cases does gamification in the learning process work and in which cases it does not? Best practices and worst practices.

- What are the differences between using gamification in higher education compared to other forms of education?

To conclude, it can be said that using game elements in higher education learning process could be very effective and it has a lot of potential to change the way students are taught. Planning courses using game elements definitely demands extra effort from the teacher but it could be the way to motivate and inspire students to be more connected to what they are studying. Studies do not have to be boring and serious for the students, when instead they could be invited to play, discuss and challenge themselves for gaining more knowledge. There is a great market out there for gamified learning that should be recognized and embraced by the modern higher education.

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Kokkuvõte

Käesolev magistritöö andis ülevaate mängude ja mängu elementide kasutamisest ülikooli õppetöös. Mängutööstus on järjepidevalt ja sure hooga kasvamas, kuid mängude kasutamisne hariduses ei ole veel eriti levinud. Samal ajal aga õppejõud ja õpetajad üle maailma otsivad võimalusi, kuidas muuta õppimisprotsess üliõpilastele kaasahaaravamaks, et nad oleksid sisemiselt motiveeritud õppima. Mängu elementide ja õpiprotsessi sidumine on näidanud kohati häid tulemusi, kuid seda, kuidas mängu elementide kasutamine õppetöös mõjutab üliõpilaste motiveeritust ja õppimise nautimise protsessi, ei ole veel eriti põhjalikult uuritud. Samuti nagu pole uuritud ka seda, kuidas tekitada õppimise protsessi käigus sarnast vooluga kaasa minemise tunnetust nagu tekib väga head mängu mängides.

Antud uurimustöö eesmärgiks on saada teada, kuidas mängu elemente saab ülikooli tudengite õpiprotsessi integreerida. Uurimustöö on koostatud juhtumiuuringuna, mis kasutab juhtumina Tallinna Ülikooli loengut Arvutimängud. Arvutimängude loeng viidi läbi imiteerides mängu ja kasutades mängu elemente läbi terve kursuse protsessi. Et luau vajalikku konteksti, selgitab antud uurimustöö esmalt mängude, tõsiste mängude ja mängu elementide kasutamise definitsioone ja näiteid. Kirjanduse ülevaade tutvustab mängu olemust, iseloomulikke elemente, kuidas eristada tõsiseid mänge meelelahutuslikest mängudest, mida tähendab mängu elementide kasutamine ning kuidas seda meetodit erinevates valdkondades, kaasaarvatud hariduses, kasutatakse.

Uurimus on koostatud kahes osas – Arvutimängude loengu üliõpilaste hulgas läbi viidud veebipõhise küsitlusena ning loengu õppejõuga läbi viidud intervjuuna. Töö autor esitas antud magistritööle kolm uurimusküsimust. Esimene küsimus oli: “Kas loeng oli üliõpilaste jaoks nii kaasahaarav, et suutis neis tekitada vooluga kaasa minemise tunnetust?” Vastavalt üliõpilaste küsitluse tulemustele ning Sweetser’i ja Wyath’I (2005) mänguvoolu (gameflow) kriteeriumitele oli loeng üldiselt edukas mänguvoolu tekitades. Tudengid olid loengule piisaval määral keskendunud, nad huvitusid loengu teemadest, protsessist ja ülesannetest, mis andis neile võimaluse olla loengusse emotsionaalselt kaasatud. Nad olid pigem kaasatud loengu protsessi ja teemadesse, kui jälgisid oma punktiskoori.

Teine uurimisküsimus oli: “Millised olid loengu õppejõu (mängu koostaja) ootused mängu elementide kasutamiseks loengus ning kas need ootused said tõeks?” Õppejõud ja loengu koostaja ootas eelkõige, et üliõpilased tunneksid, et nad ei ole tavapärases loengus vaid

mängivad mängu ja lõbutsevad. Samuti ootas ta, et antud õppetöö korralduse käigus tunnevad tudengid end rohkem kaasatuna ja motiveerituna loengus osalema. Üliõpilaste küsitluse tulemused näitasid, et nad tundsid end piisavalt emotsinaalselt kaasatuna, et antud loengule seatud eesmärki täita. Kuid seda, kas kaasatus tekkis eelkõige mängu elementide kasutamise tulemusena või seetõttu, et lihtsalt loengu sisu oli ka ilma mängu elementide kasutamiseta nende jaoks huvitav, on üsna raske hinnata.

Kolmas uurimisküsimus oli "Milliseid soovitusi saaks anda tulevikus mängu elemente kasutavate loengute koostamiseks?" Vastavalt üliõpilaste seas läbi viidud küsitluse tulemustele ning õppejõu intervjuule annab antud uurimustöö soovitusi Arvutimängude loengule sarnaste mängu elemente kasutavate loengute läbi viimiseks.

Vastavalt Arvutimängude loengu juhtumiuuringule saab anda mängu elemente kasutavatele loengutele järgmisi soovitusi:

- enne terve kursuse planeerimist mänguna on kasulik proovida kasutada mängu elemente vaid üksikus loengus või osana mõnest loengu tegevusest. Näiteks korraldada tavalise kontrolltöö või testi asemel mälumäng;
- loengus võiksid olla erinevad ja erineva raskusastmega ülesanded üliõpilastele, et nad saaksid ise määrata ja kontrollida, milliseid ülesandeid eesmärkide saavutamiseks täita. See aitab neil paremini keskenduda, kui nad ei tunne ennast koormatuna neile ebavajalikest ja ebahuvitavatest ülesannetest;
- üliõpilastele tuleb anda järjest raskemaks muutuvaid ülesandeid, et toetada nende teadmiste arengut loengu käigus. See aitab neil oma teadmisi ja oskusi proovile panna ning huvi loengu vastu üleval hoida;
- teiste üliõpilaste ja õppejõuga suhtlemine on oluline osa loengust. Grupitööd ja avatud arutelud aitavad üliõpilastel tunda end sotsiaalselt kaasatuna ning samuti tõsta mänguvoolu tekkimiseks vajalikku võistlusvaimu;
- üliõpilaste tulemusi kajastav punktitabel on hea, kuid tudengitele mitte kõige olulisem.

Lisaks antud teadmistele soovitab uurimustöö autor veel uurimisteemasid edasisteks uurimusteks, mis toetaksid mängu elementide kasutamist ülikooli õppetöös:

- Kuidas mõõta vooluga kaasa minemise tunnetuse efekti tõhusust ülikooli tudengite õppeprotsessis?

- Millistel juhtudel mängu elementide kasutamine õpiprotsessis töötab ning millistes mitte? Millised on parimad ja halvimad praktikad?
- Millised on erinevused mängu elementide kasutamisel kõrghariduse õppetöös ja teistel õppetasemetel?

Lõpetuseks võib öelda, et mängu elementide kasutamine ülikooli õppetöös võib olla väga efektiivne vahend üliõpilaste kaasamiseks. Antud meetodil on palju potentsiaali, et muuta viise, kuidas tudengeid õpetatakse. Loomulikult nõuab loengute planeerimine ja ettevalmistamine mängu elementide kasutamisel suuremat pingutust, kuid see on võimalus muuta loengute sisu üliõpilaste jaoks kaasahaaravamaks ja inspireerivamaks. Õpingud ei pea olema tudengite jaoks igavad ja tõsised, kui selle asemel võiks nad olla pigem kutsutud mängima, arutlema ja ennast proovile panema oma teadmiste kasvatamiseks. Mängu elemente kasutavate õppemeetodite kasutamiseks on juba maailmas olemas suur turg, mida moodne kõrgharidus peaks rohkem tunnustama ja oma õppetöös kasutama.

Appendixes

Appendix 1 - Interview with Game Interactions course instructor Martin Sillaots

What was the aim of designing game interactions course as a game?

The initial idea was to use the same method or mechanics for building up the course as was covered during the classes. The content of the course was game design, so I thought it could be interesting to use similar methods that can be used for game design also in the course. It would be more educational to get familiar with the game design aspects if they are implemented on students. We tried to use the same vocabulary and the same core elements as could be used in a game. This was the initial idea. And also I thought it could be more engaging to students to motivate them and to make the course more interesting. I also thought it could be interesting to me to do the course completely differently, to make it more fun to myself.

What kind of literature or previous materials did you use to design the course as a game?

I can not say, that it was a special theory. At first I thought that it would be good to start with the Game Theory, but this was something else, it is about conflicts and how to solve conflicts, it was not the case in this model. About a year ago I got found one article, it was about gamification and how to gamify the course in higher education. I don't exactly remember what was the title of the article, but it was presenting how to use game elements and how to transform them to course design elements. Also they gave some examples how the same elements can be used in business, healthcare or sports, how to get points and compete with your friends. Then I started thinking that this could be interesting. Later I started looking for different books about game-based learning and then I found one book that was called The Multiplayer Classroom. It was not about how to use games in education but about how to design a course as a game. So this was the major influencer. Maybe I tried to copy this book too much, some of the methods did not work for me so I should have improvised more and been more creative and playful when I tried to do something similar. Because this book was about solving the exercises in teams, it was like introducing the multiplayer genre of the game. A lot of different games for example in business simulations or quiz kind of games I do not have to implement multiplayer game, it can be totally different, so it is an interesting topic. I could investigate more different genres of the game

and to find out what kind of methods could be used for course design so this is something that I would like to do differently.

Can you describe, what kind of elements exactly did you use from the game for this course?

First I tried to use the game vocabulary, I named all the students as players/gamers, I as a supervisor/teacher named myself as a Game Master and the course was named as a game. Then I thought it would be nice to present a scoreboard – this was one centerpoint. I wondered how could I do this publicly, how to present the scoreboard online, because previously I have had some troubles about publishing student grades and full names. So the first activity of the course was to design their personal avatar. So they all provided some nicknames, searched for some photos, they had to design the background story, so what is interesting to them for this course. So we used avatar names. This was for the privacy concern as well as one part of the play. At least half of them enjoyed the avatar design, but some of them, they did not care, they just used their own first name and to them it was okay to publish the score. And we named also all of the assignments as missions, so we tried to use the same vocabulary and also levels and points. So this was the first idea how to integrate game into course.

How did the level part work? How did they reach the next level?

This was one idea that I was getting from the multiplayer course book. This book describes how it was in the beginning and how it was in the end, so I took the latest version to give them a feeling that they can earn points very easily, so they reach to the second or third level very easily but later, to get on the last level they needed to collect more points. Initially the course had 10 levels, but then I found out that we were running out of time, so we don't have time for all those missions, then I decreased the number of levels so that we had 9 levels and the maximum score was 80 instead of 100.

Did you run out of time because of the game part or because of the course content?

It was because when I was planning the course, I was too ambitious. I overloaded the course with too many issues, I was expecting too much. I wanted to end up with some working prototypes but we just managed to do the game descriptions.

How did you expect that using game elements in the course would affect the students' learning process?

I was expecting that they would have a feeling of not participating in a course, but in a game. I thought that if we would make jokes like you are a player and we would have some competitions, it would create that kind of feeling. Also some additional items were included. For example I tried to involve some random activities into the course, like they all had to do some papers, but only some of them had the chance to present the paper – I just picked the team randomly to do the presentations. And then I had some random students asking questions to have some competition between the students or their teams. I thought all of this would create some kind of atmosphere about not doing something traditional way. It would not be like giving presentations in front of class but more like a game kind of activity. So I tried to create the fun element, competition element and also team work. Later in the course we divided students into teams and I tried to integrate the competition models and collaboration models into the course.

How did you think that the students accepted the game elements in the course or the whole concept of the course?

In the beginning I thought that it would sound funny to some of them, because I had an impression that some of them were surprised. I also thought that maybe it was too much for them in the Master's level to tell them that we will be playing now. But in the end I thought it went fine, as no one was against those random exercises and I had an impression that some of them were happy when they were leading the scoreboard. Based on the feedback I found that they rather enjoyed the process and did not care so much about points. So I think it was fine.

So would you say, that they were more like internally motivated in the course and were not only about getting points?

Yes, not only about points. I think also the content was interesting to them and maybe I was somehow motivating them, because I also was very interested in the topic.

Which elements of game in your opinion worked the best in this course and which did not work so well? Why?

I think the teamwork part worked fine. It is difficult to separate the content part, of how engaging the content is from the management and the process part. What is also important

and I did not not think about it in the beginning is that somehow I integrated this part into the design of the course – it is the gameplay itself, the challenges and activities to achieve these challenges. So I think that the most engaging part of this course was the reasonable set of missions or challenges I gave to them. They really worked hard to achieve these objectives. I think this worked well. But I'm not very happy about this scoring system. In some level it seemed to me irrelevant. Although it was interesting to calculate those numbers. Maybe one thing I was not so happy about was the feedback element. In a gaming environment it is important to provide feedback so I thought that maybe I was too slow in providing feedback. Although I did not promise the students that the scoreboard will be online all the time when they upload something. But I introduced the scoreboard each time in the beginning of the class, so they had a peek.

What would you change in the course if you are planning to do the same course again next time?

I think I am a little bit wiser now, I understand now, that gamification is not all about scores and badges and points but it is more about flow and how to keep people in flow. So maybe next time I would like to design the missions more like that they would be easier in the beginning and they get harder and harder as the course progresses. To support the flow, they need to have more skills and knowledge to achieve the next assignment. So this is one thing that I would like to try. Although I do not know how successful it could be. Maybe it was wise to keep those missions in a balance, so that they were equally hard to me and to the students and they should not be harder. Or maybe the final exam was harder, it was quite risky to have the final presentations in front of a wider crowd. But overall I think that the final presentation part was very successful, but I did not know if they were trying harder because of that, or was it the same for them. I understood that some of the students were very nervous but others enjoyed it a lot. But I think that the students did put more effort into designing the final presentation, because instead of presenting it to one teacher, they had a big audience. Maybe for the next year, I will not use the multiplayer game genre but try something different.

Based on your experience what are now your own suggestions for the teachers who are planning to design their courses with game elements?

I think that to design the whole course as a game is somewhat risky. You have to invest a lot of time and energy into it to achieve that. At some point I thought that it was too much,

maybe I can not win this battle. Before the final event I was worried if anyone would be coming to the final event to listen to the presentations, if the students have good ideas to present. When the course started I understood that students' ideas were nice, but in other condition if the students had not been so enthusiastic and active, I would not have done so well I think. But I really enjoyed the playing part instead of me giving lectures. So one thing I would suggest for every teacher to try is to do one class or one activity of the course as a game. For example instead of running a test in a multiple question format, it would be nice to to a quiz, like Jeopardy for example. I have tried it in my previous courses so students are very actively involved when you have this gaming and competition element. I does not matter that you can not control the results in very exact way, but this kind of play can be starting point for discussions. You activate students and you can have a nice discussion afterwards. So this is something that I would like to do also in my other courses.

Is there anything else that you learned in the process that you would like to share?

I would like to integrate flipped classroom strategy, it means that I don't give many lectures, but I ask the students to read some materials or my notes at home and then we can start the class with a quiz that is based on their reading material. So when they have read the materials, they can earn points easily or make the quiz as a starting point for deeper discussions. So those that did not have time to read the materials would be able to estimate, what the answer could be, so if they are wrong, we can start the discussion about the topic. So I would like to move from lecture-based classes to more seminar-based teaching. And then I would spend the rest of the class on team works. Because I think this was the most interesting part, when they started to present their own ideas and when they started to ask questions. This is actually why we ran out of time – we tried to concentrate more on engaging activities. Also I learned from the students feedback, that some of them found it hard to find time for teamwork outside of class. So why not leave the individual reading assignments for homework and do the teamwork in the class. So this is something that I would like to change.

Appendix 2 – Game Interactions Course Program