SKILL UNLOCKED: USER EXPERIENCE OF GAMIFICATION IN E-LEARNING

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1. INTRODUCTION

The society we are a part of is becoming increasingly complex. Sociologists such as Manuel Castells refer to today's society as a network society to explain how and why today's society is becoming so complex. In an interview with Harry Kreisler at UC Berkeley, Castells defined the network society as "a society where the key social structures and activities are organized around electronically processed information networks" (*Conversation with Manuel Castells, p. 4 of 6*, n.d.). The information that is distributed through these networks plays a key role in the society we live in, because it is important for people to access and use this information to function in society. However, these networks are becoming increasingly complex as the amount of information increases and as the information is spread over an increasingly larger network (De Wilde, 2000). This means it becomes more difficult to access and use the information we need. The increasing complexity of the networks and the amount of information may demotivate people, which means they may lose the motivation to function in society (Ryan & Deci, 2000). Although a section of society is paid to function in society for fulfilling positions, studies show that money by itself is not sufficient to motivate people (ibid.). This constitutes a problem that can be approached using different methods, such as motivating people to access and use information and making information more accessible.

People can be motivated to access and use information through the use of game design elements, because game design elements allow experiences to meet the conditions necessary to make an experience useful for learning (Gee, 2008). On the one hand, traditional incentive structures like money, status, and the threat of punishment only motivate people up to a point (Werbach & Hunter, 2012). On the other hand, well-designed game elements will motivate people even when traditional incentive structures are absent (Ryan, Scott, & Rigby, 2006). The use of game design elements in non-game contexts, such as motivating people to access and use information, is known as *gamification* (Deterding et al., 2011). However, the information also needs to be easily accessible to motivate people do so.

In addition to using game design elements, which increases fun, people can also be motivated to use and access information by increasing the use of use (Bruner & Kumar, 2005). Increasing ease of use can be accomplished by structuring it similar to a course curriculum which can be taught with relatively little assistance aside from the structure itself. Learning and teaching with electronic support, such as structuring information to be similar to a course curriculum, is known as *e-learning* (Tavangarian et al., 2004).

People may not be sufficiently motivated by either gamification or e-learning by itself. However, by using gamification to support e-learning, the motivational affordance of the former and the accessibility of the latter are combined, which presents a viable solution to the problem of potential demotivation in accessing and using information. The goal of this thesis is to contribute to the development of e-learning platforms that use gamification to motivate people access and use the information in information networks of increasing complexity and to motivate people to take on lifelong learning.

1.1 Research focus

The research focus of this thesis is to conduct an exploratory investigation of user experience of e-learning platforms that use gamification. This will be done using a qualitative approach. This approach will consist of an analysis of the game design elements used by e-learning platforms and how they influence user experience and interviews with users of e-learning platforms to study how the users themselves experience the gamification of e-learning platforms.

There are e-learning platforms that do not use gamification, such as Coursera and OpenCourseWare. Furthermore, there are gamification platforms that do not specifically learn and teach, such as Fitocracy, which uses gamification to motivate its users to exercise, and DevHub, which uses gamification to motivate its users to build websites. However, there are currently only three e-learning platforms that use gamification that are open for use by everyone: Codecademy, Khan Academy, and Stack Overflow. Codecademy and Stack Overflow offer e-learning in programming. Khan Academy offers e-learning in a broad range of courses, such as history, economics, and math. In the Netherlands, there is also an e-learning startup that is currently in its development stage: Perflectie. The e-learning platform of this startup offers a feedback system to help motivate the user to learn, instead of offering courses per se.

Khan Academy and Perflectie allow the user to learn about a broad range of subjects, but Khan Academy is a popular e-learning platform with over 3.5 million users that was founded in 2006 (*Khan Academy*, n.d.), and Perflectie is a startup with 20 users that was founded in 2012. This means the former is an example of an e-learning platform that has had time to develop its gamification, with many users; the latter is an example of an e-learning platform that is still developing its gamification, with few users. For both e-learning platforms, some of the users were available for interviews. For Perflectie, Stefan op de Woerd and Jochem Aubel, the people who started the e-learning platform, were available for interviews as well. Due to these reasons, I will

use Khan Academy and Perflectie as case studies for this thesis. They will be used to evaluate how and why users experience the use of such platforms.

1.2 Research question and subquestions

The focus of this thesis is to conduct an exploratory investigation of user experience of e-learning platforms that use gamification. This means this thesis will investigate the users' experience, rather than the users' results on e-learning platforms that use gamification. Furthermore, the research focus of this thesis is the gamification, rather than the content, of e-learning platforms, to investigate how gamification influences the experience of using e-learning platforms. In the content of the research focus and the goal of this thesis, I will use the following research question:

• *How do users experience the gamification of e-learning?*

To answer the research question, I will use the following five subquestions:

1. *How is gamification defined?*
2. *How is e-learning defined?*
3. *How is gamification used in e-learning?*
4. *How do users experience gamification according to existing literature?*
5. *How do users of Khan Academy and Perflectie experience the gamification of e-learning?*

These subquestions will address the constituents of the research question: gamification, e-learning, the use of gamification in e-learning, and the user experience of gamification of e-learning in existing literature and in the case studies. Subquestions 1 through 4 will present and discuss the existing literature; subquestion 5 will present the exploratory investigation of user experience of Khan Academy and Perflectie. The subquestions will be further introduced in the chapters that address them.

1.3 Methodology

To answer the research question, I will do a literature review, analyze game design elements using ludic semiotics, and conduct semi-structured interviews.

The first method is the literature review, which will critically discuss literature on gamification in general and gamification in e-learning. This literature review presents an overview of the existing research on the subject and will be used to develop a framework for analyzing the case studies. The

literature review will include studies on game design elements and games user research. Based on the literature review, definitions will be introduced in this thesis. Publications on gamification in general include popular as well as academic works on how and why to use gamification and are used as starting points for further research. The studies on game design elements present definitions of these elements. Furthermore, they discuss how users experience them in games and in contexts where they are used as part of gamification. The studies on psychology and games user research discuss how users experience gamification and related phenomena. These studies will be used to help develop a framework to investigate how users experience gamification in e-learning.

A second method to study how users experience gamification in e-learning is to study how game design elements generate meaning for the user. To do so, I will analyze game design elements using semiotics. Semiotics is a method that "may be broadly understood as the investigation and development of theories and models of the creating of meaning" (Lindley, 2005). Game scholar Craig Lindley developed a branch of semiotics he has termed *ludic semiotics*, which he uses to study how game design elements are correlated to player affects in ludic systems. *Ludic systems* "encompass a family of media forms and experiences involving elements of simulation, game play and narrative or story construction" (Lindley, 2005). The framework proposed by Lindley will be discussed in further detail in section 1.4.

A third method to study how users experience gamification in e-learning is to study the users themselves. In qualitative research, such as games user research, an interview is a rich data source for subjective impressions with the possibility to ask follow-up questions according to games user researcher Ben Lewis-Evans (2012). He claims that if interviews are conducted face-to-face, the interviewer can interact with the interviewee to a much greater extent than if he or she were conducting questionnaires or even focus groups, which can lead to rich data. However, he also claims that there are three disadvantages to conducting interviews as part of games user research: interviews are subjective, difficult to quantify, and time-consuming. The research focus of this thesis is to study the user experience of gamification in e-learning, which is subjective by definition. Furthermore, I will use a qualitative approach, which means that the difficulty to quantify interviews is not as relevant to this thesis as it would be if questionnaires were used instead. Using a qualitative approach is also more relevant to the research focus, as such an approach is exploratory in nature, whereas a quantitative approach focuses more on fact-finding and theory-testing. Finally, although Lewis-Evans claims that interviews are time-consuming, I will process 10 interviews over the course of 4 weeks, which is sufficient time to do so. Therefore, the disadvantages Lewis-Evans

discusses should not pose problems for this thesis. The framework to conduct the interviews will be discussed in further detail in section 1.5.

1.4 Semiotic framework

Lindley argues that ludic systems consist of four distinct layers of meaning: a discourse level, a simulation level, a performance level, and a generation level.

First, the *discourse level* is "the level at which a plot is revealed (i.e. represented) via one or more discursive episodes" (Lindley, 2005). According to Lindley, this level corresponds to the semiotic domain of narrative, which he defines as a "representation of the causally interconnected events of a story" (Lindley, 2005). Lindley uses the concept of fictive blocks, or "basic fragments or units of fictional/narrative significance that may be strung together to form a larger scale narrative" to describe these causally interconnected events. The player may or may not be able to influence these fictive blocks, because they may be achieved by cutscenes, which do not allow the player to interact with the game as they are revealed.

Second, the *simulation level* "represents the lowest level of temporal design concern, addressing features such as the basic realization of motion and other functional characteristics of a world" (Lindley, 2005). According to Lindley, this level corresponds to the semiotic domain of simulations, which he defines as "a representation of the function, operation, or features of one process or system through the use of another" (Lindley, 2005). The changes in the state of a ludic system over time are designed on the simulation level.

Third, the *performance level* is the "level at which the player is not simply an active viewer, but an active participant within the ludic world" (Lindley, 2005). According to Lindley, this level corresponds to the semiotic domain of games, which he defines as "a goal-directed and competitive activity within the framework of agreed rules" (Lindley, 2005). The moves a player makes, which Lindley defines as "a connotation of a physical or simulated action allowed and facilitated by the framing of the game" (Lindley, 2005), constitute a part of the performance level.

Fourth, the *generation level*, which is also referred to as the *generative substrate*, is "the system of functions, rules and constraints constituting a space of possible worlds of experience created by the designers of the game" (Lindley, 2005). The generative substrate consists of the diegesis (i.e. "the world and its causally interrelated events" (Lindley, 2005), the plot, and the order of presentation of the contents of the plot, but also the software code of the game framework.

The levels are sublevels of the ludic system that constitute the player's experience. In a ludic system, these levels interact with each other. The generative substrate consists of the diegesis,

which is realized on the discourse level; and the rules as they are presented in the software code, which are realized on the simulation level. The simulation level determines the moves a player can make on the performance level. The moves a player can make determine how the plot will be revealed on the discourse level. Although ludic systems consist of these levels, some levels may not be as present in some ludic systems as they are in other (e.g. the discourse level is much less present in a flight simulator, as there is not as much of a narrative in a flight simulator). Nonetheless, these interactions between these levels take place in all ludic systems, regardless of their media forms.

The media forms that ludic systems encompass include games and hybrid forms of games, simulations, and narratives (Lindley, 2005). Lindley's structural framework of ludic semiotics was published in 2005, when gamification was not a popular phenomenon. However, it can be argued that gamification is also a hybrid form of games, simulations, and narratives, as gamification also makes uses of representations of one process or system through the use of another (i.e. games through non-game contexts, Lindley, 2005) and causally interconnected events.

Gamification, as a ludic system, can be studied analyzing the game design elements with ludic semiotics. However, the users of gamification can also be studied by conducting interviews.

1.5 Interview framework

The interviews will give the users enough time to describe their experience of gamification in e-learning (Lewis-Evans, 2004). I will structure the interviews to allow the interviewees to discuss their experience of gamification of the e-learning platform, rather than the e-learning platform per se, without influencing them to give a specific answer. To do so, I will use the heuristic evaluation method. Heuristic evaluation "is done by looking at an interface and trying to come up with an opinion about what is good and bad about the interface" (Nielsen & Molich, 1990) and offers the interviewees concrete aspects of user experience that they can use to describe their experience. It should be noted that the "opinion about what is good and bad about the interface" is the interviewee's opinion, which is influenced by their experience, and not the interviewer's opinion.

There are different frameworks and models that offer frames to study user experience of games. These frames can be used to develop questions that are related to objective particularties of user experience. Two of these are the MDA framework (Hunicke, LeBlanc, & Zubek, 2004), which uses three frames to understand games from the perspectives of game designers and players, and the CEGE model (Gámez, 2009), which studies the core elements of the gaming experience. These offer player-centric frames that discuss the player's experience of both the game and the game

design elements that constitute the game. Due to this, I will use the MDA framework and the CEGE model to develop the questions to help the interviewees describe their experience.

The MDA framework uses three frames to study games: mechanics, dynamics, and aesthetics. Mechanics "describe the particular components of the game" (Hunicke, LeBlanc, & Zubek, 2004, p. 2), dynamics "describe the run-time behavior of the mechanics acting on player inputs and each others' outputs over time" (ibid.), and aesthetics[1] "describe the desirable emotional responses evoked in the player" (ibid.). The framework was developed to help understand the perspectives of the game designer and the player. According to Hunicke, LeBlanc, and Zubek, the game designer's perspective is framed by the mechanics frame, and the player's perspective is framed by the aesthetics frame (i.e. the player's desirable emotional responses) (ibid.). Because the research focus of this thesis is the user's experience, I will focus on the aesthetics frame to develop the questions for the interviews. The aesthetics component of the MDA framework consists of a taxonomy of eight components of 'fun':

- *sensation*, or "Game as sense-pleasure" (ibid.);
- *fantasy*, or "Game as make-believe" (ibid.);
- *narrative*, or "Game as drama" (ibid.);
- *challenge*, or "Game as obstacle course" (ibid.);
- *fellowship*, or "Game as social framework" (ibid.);
- *discovery*, or "Game as uncharted territory" (ibid.);
- *expression*, or "Game as self-discovery" (ibid.);
- *submission*, or "Game as pastime" (ibid.).

These components serve to describe what makes a game 'fun', as the authors claim that the vocabulary used to describe 'fun' is too limited. Three of these components are related to the game design elements used in the e-learning platforms that I will use as case studies in this thesis: fellowship, expression, and challenge. The selection of these components is hypothetical, and their relevance to the user experience of Khan Academy and Perflectie will be evaluated by means of the interviews.

Fellowship is not relevant for Khan Academy because it does not offer a substantial social framework. This component is relevant for Perflectie because it incorporates a development team, a group of people who rate the player's progress. Expression is relevant because the player discovers

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[1] In the MDA framework, the aesthetics serve as a taxonomy of 'fun'; the term 'aesthetics' as used in the MDA framework should not be confused with aesthetics as a discipline of philosophy.

their strengths and weaknesses in their studies or as part of their development goal, the subject the user wishes to learn by means of Perflectie. Expression was considered for inclusion in the interviews with the users of Khan Academy, but was omitted as the focus of Khan Academy is on the content, rather than on the user discovering themselves and their strengths and weaknesses. Challenge is relevant for Khan Academy because the e-learning platform challenges the user by motivating him or her to achieve certain goals to progress. Challenge was considered for inclusion in the interviews with the owners and users of Perflectie, but was omitted in these interviews as Perflectie facilitates learning rather than challenging the player.

The components of aesthetics are defined as aspects of games that make them 'fun'. The three selected components will be used as questions during the interviews. If they are presented to the interviewees as their definitions, the interviewees may be influenced to discuss the definition rather than discussing how the e-learning platform is fun in the sense of the component. In the list of interview questions, I have reformulated the components as questions (i.e. challenge is formulated as "How did Khan Academy challenge you to learn?").

The CEGE model is used to study the core elements of the gaming experience. In this model, the player's enjoyment is at the core, and is influenced by the game itself and by puppetry, which Gámez describes as "how the player starts approaching the video game until eventually the game being played is the outcome of the actions of the player" (2009, p. 72). The CEGE model was developed to "devise an objective assessment of the concept of user experience […] as a two fold phenomenon formed by a process and an outcome" (2009, p. 3).

To assess the user experience of games, Gámez developed a pool of questions that describe the constituents of the gaming experience (2009, pp. 180-182). The questions describe how the users experienced the game in general, the gameplay, and the components of puppetry: control, ownership, and facilitators. Control describes the "actions and events that the game has available to the player" (2009, p. 72), ownership describes "when the player takes responsibility of the actions of the game" (ibid.), and facilitators "external factors relate to the player's subjectivities, such as previous experiences with similar games or aesthetic value" (ibid.). Each question is related to the user's experience of the game in general, gameplay, or one of the components of puppetry. To allow the user to discuss the core elements of the gaming experience, I have selected eleven questions (and the corresponding constituents of the gaming experience):

- *How fair were the rules of the e-learning platform? (Gameplay)*
- *Did you understand the rules of the e-learning platform? (Gameplay)*
- *What did you feel whilst using the e-learning platform? (Game in general)*

- *How do you feel about having used the e-learning platform? (Game in general)*
- *Would you keep using the e-learning platform? (Game in general)*
- *What were you supposed to do to reach your goal? (Control)*
- *Which actions could you perform on the e-learning platform? (Control)*
- *What do you think of the time you have used the e-learning platform in? (Facilitator)*
- *To what extent did you receive rewards as you progressed? (Ownership)*
- *How responsible did you feel for the outcome? (Ownership)*

These questions involve the game experience, gameplay, and components of puppetry as broadly as possible. I omitted the remaining questions for four reasons. First, some of the remaining questions were the negative or positive versions of the questions I use. Second, some of them were not applicable to Khan Academy and Perflectie because they referred to components that are absent in these platforms (e.g. sound, controllers). Third, some of the questions overlapped with the questions used because they were phrased as neutral statements (e.g. "I received rewards as I progressed during the game" (Gámez, 2009) and "The only reward I received was when I finished the game" (ibid.)). Fourth, some of the remaining questions were redundant (i.e. questions that discuss personal goals; the goal of Perflectie is to create and reach a personal development goal).

The questions in the CEGE model are presented as positive and negative statements. However, they will be used as actual questions during the interviews. If they are used as statements, they may influence the interviewee's answer to be positive or negative. In the list of interview questions, I have reformulated the statements as questions. Furthermore, the questions refer to a game, which may cause the interviewees to confuse the e-learning platforms with games. Therefore, I have replaced "a game" by specifically mentioning the e-learning platform instead.

1.6 Overview of the thesis

This thesis consists of seven chapters, including the introduction. Chapter 2 presents a literature review on gamification and discusses how gamification is related to ludification of culture. Furthermore, it discusses which game design elements are used in gamification and studies these elements using ludic semiotics.

Chapter 3 discusses how gamification has been used and how it is currently used in e-learning. The chapter presents a definition of e-learning and discusses how gamification can be used and how it is used in e-learning.

Chapter 4 presents theories and models from psychology and games user research that are used to study user experience of gamification in general and of gamification in the context of e-learning.

Chapter 5 presents the case studies of this thesis, Khan Academy and Perflectie. The chapter discusses the interviews with the owners and users of Khan Academy and Perflectie and analyzes their game design elements using ludic semiotics. Furthermore, it discusses the analysis of the case studies in the context of the literature.

Chapter 6 presents a summary, conclusion, and discussion on the limitations and further research opportunities.

2. GAMIFICATION

The first important concept in this thesis is gamification. Before the user experience of gamification in the case studies can be investigated, this concept has to be defined and situated in a socio-cultural context. The definition and situation of gamification will influence which phenomena this thesis will study and how these phenomena are studied in the context of the case studies.

This chapter will situate gamification in the socio-cultural context of play (Huizinga, 1950) and ludification of culture (Raessens, 2006). Furthermore, this chapter will present three definitions of gamification (Deterding et al., 2011; Huotari & Hamari, 2012; Zichermann & Cunningham, 2011). Finally, this chapter will analyze game design elements as the constituent phenomena of gamification and how they generate meaning. This will be done using the ludic semiotic framework (Lindley, 2005).

The purpose of this chapter is to define gamification and related concepts in the context of this thesis. The findings of this chapter will be used to present the definition of gamification that will be used in this thesis and to discuss the game design elements in the case studies. This chapter will answer the following subquestion:

- *How is gamification defined?*

2.1 Gamification, play, and ludification of culture

Gamification, in a socio-cultural context, is a phenomenon of *play*. Historian Johan Huizinga wrote an influential treatise on man and play, *Homo Ludens* (1950), in which he argues that play is based on four conditions: it is free, it is distinct from ordinary life, it creates order, and it is not connected to material interest (1950, pp. 8-13). The condition that play is free means that it is both voluntary and an expression of freedom.

The boundary that distinguishes play from ordinary life is referred to as the *magic circle* by Huizinga (1950). Game scholar Markus Montola (2005) discusses Huizinga's concept of the magic circle and how games can expand the magic circle by blurring the boundary between play and ordinary life. He argues that games can blur this line spatially, temporally, and socially. Spatial expansion means that it is unclear where these games are actually played. However, the "spatial expansion only applies to games that are affected by the player's spatial context" (2005, p. 2), which means that the game and the player need to interact with the spatial context to expand the magic circle spatially. Temporal expansion means that the game expands beyond the explicit play session, which can be done by making the game stay dormant for prolonged periods of time, or by

leaving the player uncertain of when the game starts or ends. Social expansion means that the boundary between players and non-players is obfuscated. This can be achieved by involving the audience and allowing the audience to influence the game, or by using non-players as game elements. According to Montola, these forms of expansion can make a game more interesting by adding uncertainty to when the player is actually playing the game.

According to media theorist Joost Raessens, games, in the socio-cultural context of play, transform the construction of personal and cultural identities. He refers to this process as the *ludification of culture* (2006). He argues that computer games, mobile games, and games on the internet play a significant role in the ludification of culture because they play such a prominent role in culture. Raessens points out that young people in the Netherlands have 45 hours per week for leisure activities, of which they spend 19 hours on average on media such as games. For people spend such a substantial amount of time on games, games play a significant role in the construction of personal and cultural identities. Gamification uses elements of games, and as such, is also a part of ludification of culture. Gamification can play a key role in ludification of culture because can be used in a plethora of sectors and industries, from healthcare (McGonigal, 2012), to marketing, human resource management, and even recycling (Zichermann & Cunningham, 2011). By using game design elements in these contexts, the construction of personal and cultural identities is increasingly influenced by games.

Comparable to Raessens, Deterding et al. (2011) situate gamification within the frame of ludification of culture to contrast gamification against similar phenomena of play. They propose two dimensions to situate phenomena in this frame: whole/parts and play/game. The first dimension distinguishes the use of full-fledged games from the use of elements of games. Deterding et al. argue that the use of elements of games "afford[s] a more fragile, unstable 'flicker' of experiences […] between playful, gameful, and other, more instrumental-functionalist modes" (2011, p. 3). These instrumental-functionalist modes are the modes of the context gamification is used in. If gamification is used in healthcare, another mode can be helpful or careful modes. The second dimension distinguishes games from the phenomenon of play.

These two dimensions offer an overview of the means by which ludification of culture occurs. In particular, Deterding et al. contrast gamification with *pervasive games* and *serious games*. By extrapolating the definition of gamification, pervasive games can be defined as the extension (rather than the use) of game design elements in non-game contexts; in the same manner, serious games can be defined as "the use of full-fledged games [rather than only game design elements] in non-

game contexts" (2011, p. 5). The following distribution of phenomena is the result of the possible combinations of the whole/parts and play/game dimensions (ibid.):

- whole/play: toys
- whole/game: (serious) games
- parts/play: playful design (such as pervasive games)
- parts/game: gamification

Serious games and gamification are used for similar purposes. Because they are on opposite spectrums of the whole/parts dimensions, serious games and gamification can be differentiated by investigating whether a phenomenon uses game design elements or full-fledged games (Deterding et al.). However, because they are both on the game spectrum of the play/game dimension, it can be difficult to distinguish them. By extension of the definition of Deterding et al., serious games can be defined as "the use of whole games in non-game contexts" (2011, p. 5). However, this does not define the difference between the use of whole games and game design elements. Kapp claims that games are situated in a pre-designed game space (2012); gamification, in contrast, "tends to take the use of a game outside of a defined space and apply the concept" (2012, p. 15) to other non-game contexts. Gamification takes the use of a game and applies it to non-game contexts, and as such, influences people with game design elements where they might otherwise not be influenced by games. As such, gamification contributes substantially to the ludification of culture. To further investigate gamification and how it is related to ludification of culture, I will discuss the definition of gamification.

2.2 Definition of gamification

The phenomenon of gamification has been described based on a number of different definitions by different authors and will be presented in the following. Three of the most commonly used definitions are those by Deterding et al. (2011), Huotari and Hamari (2012), and Zichermann and Cunningham (2011). First, Deterding et al. define gamification as "the use of game design elements in non-game contexts" (2011, p. 2). This definition was proposed to differentiate gamification from similar socio-cultural phenomena and to situate gamification in the field of these phenomena.

Second, Huotari and Hamari define gamification as "a process of enhancing a service with affordances for gameful experiences to support user's overall value creation" (Huotari & Hamari, 2012, p. 4). This definition originated in service marketing and is intended to facilitate the research on how gamification can contribute to the marketing sciences. Huotari and Hamari (2012) further

differentiate their definition from the definition by Deterding et al. by arguing that their own definition is based on an experiential approach, whereas the definition by Deterding et al. is based on a systemic approach. This means that the former is oriented towards the user's experience, whereas the latter is based on the (game) system involved in gamification.

Third, Zichermann and Cunningham define gamification as "the process of game-thinking and game mechanics to engage users and solve problems" (2011, p. xiv). This definition was developed to present a framework in which the constituents (i.e. game-thinking, game mechanics, and engagement) could be further discussed. Although game-thinking is not defined, Zichermann and Cunningham define game mechanics as "the tools used to create games", 2011, p. 77) and engagement as "the period of time at which we have a great deal of connection with a person, place, thing, or idea" (2011, p. xvi).

The definition proposed by Deterding et al. is the most neutral definition as it does not presuppose a purpose, in contrast with the other two definitions. Furthermore it differentiates gamification from related phenomena. Although the definition proposed by Huotari and Hamari (2012) is experiential, and may thus seem to be more appropriate for use in this thesis, their definition does not discuss what these experiences are or how they are generated. Therefore, using a definition that focuses on the system and how it generates experience is the most appropriate for this thesis. Due to these reasons, I will use the definition proposed by Deterding et al. in this thesis.

Gamification can not be considered as play when it is not free or when it is connected with material interest, as it does not meet the conditions of play (Huizinga, 1950) in these circumstances. Werbach and Hunter (2012) mention internal gamification as an example where gamification may not be free, as all employees of a business are forced to use a system that uses gamification. They also discuss that gamification may be connected to the player's material interest, such as when a system that uses gamification rewards the player with material rewards. As a business strategy, gamification is always connected to the business's material interest (Zichermann & Cunningham, 2011); however, the business does not play in the context that uses gamification, it only provides the context and the gamification. The use of gamification as a business strategy has led to criticism from game designers.

The term gamification and the use of gamification have been criticized by game designers such as Ian Bogost (2011) and Margaret Robertson (2010). Bogost criticizes gamification because he regards it is a marketing gimmick that is used to make the power of games accessible in business (2011). He further argues that the game design elements used in gamification are the least essential game design elements, where he regards the parts of games that produce meaningful experiences as

the most essential game design elements[2]. Bogost argues that gamification is too effective a term, as it draws attention to the word 'game', and the suffix '-ification' makes it seem that the positive results of gamification automatically occur after game design elements are implemented. Furthermore, Bogost claims that gamification is used to extract personal information from users, which he regards as exploitation of the user. To disassociate gamification from games and to emphasize this exploitation, Bogost proposes to refer to gamification as *exploitationware*.

Robertson (2010) also argues that gamification uses the least essential game design elements. However, where Bogost mentions a number of different elements (e.g. points, leaderboards, badges), Robertson identifies points as the least essential game design element. She argues that the essential part of games is that they offer meaningful choices to the player. Although Robertson argues that points are a useful means to signify progress, she claims gamification conflates points and games. She argues that gamification regards points as the most essential game design element. Due to this conflation, she proposes to refer to gamification as *pointsification*.

Bogost and Robertson criticize gamification because they claim that it does not produce meaningful experiences for the player. However, it should be noted that both game designers seem to base their claims on their observations of gamification and their ideas of which game design elements are essential, rather than on studies or empirical observations. This means their claims should be regarded as hypotheses, rather than conclusions. Furthermore, they focus on how game design elements do not allow for the production of meaningful experiences. They do not critically reflect on these game design elements and the role they play in games and gamification.

2.3 Gamification and game design elements

Gamification is the use of game design elements in non-game contexts. This means that the game design elements play a key role in how users experience gamification. Deterding et al. categorize game design elements into five levels:

- *game interface design patterns*, or "common, successful interaction design components and design solutions for a known problem in a context, including prototypical implementations" (Deterding et al., 2011, p. 4);
- *game design patterns and mechanics*, or "commonly reoccurring parts of the design of a game that concern gameplay" (ibid.);

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[2] It should be noted that, in his critique of gamification, Bogost does not define what these parts of games are, nor how they produce emotional experiences.

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- *game design principles and heuristics*[3], or "evaluative guidelines to approach a design problem or analyze a given design solution" (ibid.);
- *game design models*, or "conceptual models of the components of games or game experiences" (ibid.);
- *game design methods*, or "game design-specific practices and processes" (ibid.).

According to Deterding, these levels were developed by "teasing out analytically the different things they had been talking about, and matching that to standing concepts in the game design literature, arranged in an order of low [to] high abstraction" (Deterding, personal communication, 2013). These levels categorize how players interact with game design elements, which means they can be used as a framework to discuss how they influence the player's experience. This framework is based on the abstraction of the corresponding level. Game interface design patterns are the most concrete game design elements, which means the player interacts with them as discrete components; game design models are the second-most abstract level, which means players interact with them throughout the game experience. How directly a player interacts with a game design element, and thus how directly it influences the player's experience, is influenced by the level of abstraction of the game design element. The game design design elements that are used most commonly in gamification are reward systems (which consist of points, levels, and achievements), goals, leaderboards, tutorials, and user interfaces.

The *reward system* motivates the player as he or she progresses through the game. Because the reward system addresses the functional characteristics of the game (i.e. the distribution of rewards), it is a part of the simulation level (Lindley, 2005). Furthermore, the reward system is a part of the framework of agreed rules that a game is situated in, which means it is also a part of the performance level. Although the rewards themselves may help to reveal the plot, the reward system per se is not related to the narrative. This means it is not a part of the discourse level. Finally, the reward system consists of rules regarding the distribution of rewards. As a set of rules, the reward system is also a part of the generative substrate.

The reward system generates meaning by motivating the player with rewards. In the ludic system, this meaning is generated by addressing the distribution of rewards that are used to motivate the player. The reward system also addresses the player's goals, as the player decides which rewards are meaningful to him or her, which determine how he or she plays the game.

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[3] In the definition by Deterding et al. (2011), the term 'heuristics' is used to refer to a level of game design elements; the term as used by Deterding et al. should not be confused with heuristics as defined by Nielsen and Molich (1990).

According to Wang and Sun (2011), the reward system has four attributes "that can be used to analyze their influences on different kinds of players" (ibid.): the social value for comparison or social interactions, how the rewards affect gameplay by helping advance a game or unlocking new content, their suitability for collection and review, and the time required to earn a reward. Wang and Sun (2011) discuss eight types of rewards: score systems, experience points, virtual items, resources, achievements, feedback messages, plot animations and pictures, and unlocking new content (2011, pp. 3-5). The most commonly used rewards in gamification are points, levels, and achievements.

Points are a means to quantify the player's progression within a game or a system that uses gamification. Points generate meaning by quantifying and signifying the player's progression through the ludic system over time. This motivates the player by signifying his or her current state of progress. They may further motivate the player if they are used to determine the distribution of rewards, which means they help determine the player's goals and signify the player's progression towards that goal.

According to Werbach and Hunter (2012), points determine the win state of a system that uses gamification (assuming it has a win state), create a connection between progression in the game and rewards, and provide feedback. Assigning different point values to different activities in a system that uses gamification allows the game designers to make activities more desirable than others, depending on the rewards for accruing points and the types of points earned for different activities. Points can be used to determine how and when further rewards are distributed. For example, points can determine when the player advances in level.

According to Zichermann and Cunningham, "levels indicate progress" (2011, p. 45). *Levels* can be used to increase the difficulty by requiring a greater number of actions to succeed or by increasing the complexity of the system. They can also signify a player's position in the game.

In ludic systems, levels are comparable to points. Levels generate meaning by representing the player's progression through the ludic system over time and increasing a level can be a goal or signify a player's progression towards a goal. If they are used to increase the difficulty, they also generate meaning by facilitating an experience that demands more skill from the player. Finally, levels can be used to signify the player's role in the narrative, which means they generate meaning by rewarding the player with a different role in the narrative. Levels can be signified by achievements.

Game scholars Juho Hamari and Veikko Eranti define an *achievement* as an "optional challenge […] that is independent of a single game session and yields possible reward(s)" (2011, p. 1). They

claim that achievements have "elements of one signifying element [the visual badge], one or more completion logics and at a minimum one reward" (2011, p. 15). The completion logic is "a trigger which is a player-invoked action or a system-invoked event, one or more bounding conditions for the gamestate that can be affected during a game sessions […] and pre-requirements for the game setting that can only be modified before the beginning of a game session" (ibid.). The badge consists of a name, an image, and a description and signifies that the player has received the respective achievement. Rewards for getting an achievement may include points, in-game items, and out-of-game rewards (virtual or physical rewards).

Achievements generate meaning for the player by motivating him or her to invoke the completion logic to receive the achievement; achievements reward players for completing actions that the game designers deem desirable (Hamari & Eranti, 2011). According to Werbach and Hunter (2012), achievements can serve as goals for the users because of the rewards that are associated with them. However, the player may regard either the endogenous goal of triggering the achievement's completion logic or the exogenous goal of earning the achievement as the goal in itself, which influences how the achievement generates meaning for the user.

Goals are can be divided into three types, according to game scholar Markus Montola (2005): *endogenous*, *exogenous*, and *diegetic*. Endogenous goals are made explicit in the rules. Exogenous goals are brought to the game activity by the player. Diegetic goals are generated by "the player's reading of all the available representations regarding the state and the properties of the diegetic world" (Montola, 2005, p. 2).

The goal types identified by Montola can be used to discuss how goals generate meaning on the levels in a ludic system. On the discourse level, endogenous and diegetic goals address the revealing of the plot. Endogenous goals determine when a discursive episode occurs that reveals the plot; diegetic goals address the player's interpretation of the diegetic world and its narrative. As such, goals generate meaning by addressing when the discursive episodes of the narrative are revealed (endogenous) and by addressing how meaningful a goal is to the player (diegetic).

On the simulation level, endogenous goals address the distribution of rewards, which means it is also related to the reward system. Goals determine the conditions the player must meet to receive rewards. As such, goals generate meaning by addressing the conditions the player must meet to receive rewards.

On the performance level, endogenous and exogenous goals direct the activity in the ludic system. On this level, goals generate meaning by addressing why the player participates in the ludic system, either because they present the conditions for the player to progress (endogenous) or

because the player wants to achieve a goal for intrinsic reasons (exogenous). For example, a player may have an exogenous goal to achieve the first rank on the game's leaderboard.

According to Zichermann and Cunningham, "the purpose of a leaderboard is to make simple comparisons" (2011, p. 50). They discuss two types of *leaderboards*: the *no-disincentive leaderboard* and the *infinite leaderboard*. The no-disincentive leaderboard lists the player in the middle of a ranking that consists of the players directly above and below the player in an absolute ranking. The infinite leaderboard uses a number of different rankings that may be based on the player's absolute ranking or their ranking relative to friends, nearby players, or recent sessions (or a conjunction of views, such as a ranking relative to recent sessions of friends).

Leaderboards allow players to compare their progress with the progress of other players. This generates an affordance to compete with other players. Leaderboards make a game competitive by means of this affordance. This means they are a part of the performance level of ludic systems. On this level, they generate meaning by addressing how the player situates him- or herself in comparison to other players. However, this does not generate meaning for players who are not competitive. To compete with other players, the player is first introduced to the rules of the ludic system, which is the purpose of tutorials.

Andersen et al. (2012) divide *tutorials* into two categories: "those that provide contextually relevant suggestions from within the application interface and those that provide documentation outside of the application context" (Anderson et al., 2012, p. 60). This influences how players experience the tutorial and the game, as it addresses how much meaning is generated from within and outside the context. According to Andersen et al., tutorials had the greatest value in unconventional and complex games, whereas they have little impact in less complex games where the system can easily be mastered through experimentation. It also helps to discuss how players generate meaning from tutorials, as a tutorial for a system that can easily be mastered through experimentation may have little meaning. Tutorials are used in *onboarding*, or "the act of bringing a novice into your system" (Zichermann & Cunningham, 2011, p. 59).

Tutorials introduce players to the framework of agreed rules, and as such, they are a part of the performance level in ludic systems. Furthermore, tutorials may also introduce the player to the narrative by revealing the first discursive episode(s) of the ludic system. As such, tutorials generate meaning by introducing the player to the ludic system by teaching him or her how to interact with the system. One of the goals of tutorials is to teach the player how to interact with and interpret the user interface.

According to Jørgensen (2012), the *user interface* consists of the "graphical, auditory, and tactile features related to hardware and software that allow the player to interact with the system beyond" (2012, p. 145). This means that the player interacts with the game by means of the interface. Due to this, the interface significantly influences the player's experience. The interface is divided into the physical and the virtual interface: "The physical interface consists of the hardware, such as controllers and display, while the virtual interface is the auditory and visual software features that allow the player to interact with the game system" (ibid.). The physical interface allows the player to generate input for the game, while the virtual interface allows the player to receive output from the game.

The physical interface allows the player to generate the input for the functional characteristics of the ludic system, and the virtual interface represents these functional characteristics. As such, the user interface is a part of the simulation level. Furthermore, the user interface allows the player to interact with the game, and as such, is a prerequisite for him or her to be an active participant in the ludic system. This means the user interface also plays a key role on the performance level. How the user interface allows the player to interact with the game also influences how the user experiences the game (Jørgensen, 2012). This is comparable to how players experience the tutorial differently if it provides suggestions from within or outside the context of the game.

3. GAMIFICATION IN E-LEARNING

The second important concept in this thesis is e-learning. Before the user experience of gamification in the e-learning platforms of the case studies can be investigated, this concept has to be defined. The definition of e-learning will influence how the e-learning platforms of the case studies will be studied.

This chapter will present a definition of e-learning (Tavangarian et al., 2004, p. 274) and related concepts. Furthermore, this chapter will present and discuss the e-learning platforms that use gamification: Codecademy, Khan Academy, Stack Overflow, and Perflectie. Finally, this chapter will discuss the game design elements used in these e-learning platforms.

The purpose of this chapter is to define e-learning and to introduce the case studies of this thesis. The findings of this chapter will be used to present the definition of e-learning that will be used in this thesis and a preliminary discussion of the e-learning platforms that use gamification, including the case studies, and the game design elements they use. This chapter will answer the following subquestions:

- *How is e-learning defined?*
- *How is gamification used in e-learning?*

3.1 Definition of e-learning

E-learning, as a phenomenon that has been discussed recently in the context of gamification, has a number of different definitions. Sangrà, Vlachopoulos, and Cabrera (2012) reviewed fifteen definitions of e-learning from journals, books, and websites. They found these definitions can be categorized into four types: *technology-driven*, which present the technological aspects as primary and remaining characteristics as secondary; *delivery-system oriented*, which present e-learning as a means of accessing knowledge; *communication-oriented*, which emphasize e-learning as a communication tool and presents the remaining characteristics as secondary; and *educational-paradigm-oriented*, which presents e-learning as a new way of learning. The definitions in these categories present different perspectives on the purpose of e-learning and how e-learning serves this purpose. Because the research focus of this study is the gamification of e-learning and its effects on user experience, which means the focus is also on the influences on how users learn, I will use an educational-paradigm-oriented definition:

"We will call e-learning all forms of electronic supported learning and teaching, which are procedural in character and aim to effect the construction of knowledge with reference to individual experience, practice and knowledge of the learner. Information and communication systems, whether networked or not, serve as specific media […] to implement the learning process." (Tavangarian et al., 2004, p. 274)

The definition by Tavangarian et al. is educational-paradigm-oriented, because it emphasizes that e-learning presents a new way of learning. Furthermore, their definition also discusses the media implemented in e-learning. Because gamification is an aspect of these media, the inclusion of media in the definition is important for the purpose of this thesis. For these reasons, I will use the definition proposed by Tavangarian et al.

It is also important to distinguish e-learning from *distance learning*. According to Kaplan-Leiserson (n.d.), distance education is broader than and entails the definition of e-learning. He defines distance learning as an "educational situation in which the instructor and students are separated by time, location, or both" (n.d.), which "does not preclude the use of the traditional classroom" (ibid.). Because distance learning entails e-learning, e-learning also generates an educational situation in which the instructor and students are separated by time, location, or both.

Another term that is related to gamification in e-learning is the term *educational computer game*. Educational computer games are a medium of e-learning. Mayer (2011) defines the educational computer game as "a computer game in which the designer's goal is to promote learning in the player based on specific learning objectives." (2011, p. 284). By extrapolating the definition of educational computer games, we can define educational gamification as a use of gamification in which the designer's goal is to promote learning in the player based on specific learning objectives. These learning objectives differ per e-learning platform.

3.2 Gamification in e-learning platforms

Gamification in e-learning is the use of game design elements in e-learning (Deterding et al., 2005). This means that game design elements are the focus of the study the user experience of gamification in e-learning. I will discuss how different e-learning platforms use game design elements. In particular, I will study the e-learning platforms discussed in the introduction: Codecademy, Khan Academy, Stack Overflow, and Perflectie.

Codecademy (2011) is an e-learning platform that teaches users how to program by giving them projects, which consist of exercises and instructions on how to complete the assignments.

Codecademy also offers courses, which consist of a group of projects on a single programming language. The website offers content for different programming languages, including CSS, HTML, PHP, Ruby, and Python. Its visual interface consists of a terminal where players can submit text (i.e. code) and a sidebar that may show instructions; its physical interface consists of the keyboard, to submit text and the mouse, to click on components of the visual interface. It should be noted that the visual interface represents a terminal as it is used in programming to generate an experience that is similar to that of programming.

As an e-learning platform that uses gamification, Codecademy uses *tutorials*, *goals*, and a *reward system* that consists of *points* and *achievements*. The tutorial provides contextually relevant suggestions from inside the interface (Andersen et al., 2012). The user completes the tutorial by correctly submitting the code presented in the instructions into the terminal. As the user interface of Codecademy represents a terminal used for programming, it can be regarded as relatively complex if the user is not familiar with such a terminal. These users are the target group of Codecademy. The endogenous goal of Codecademy is to complete projects. The project's constituent exercises can be completed in any order, but all exercises have to be completed to complete the project.

Users earn 1 point for every exercise they complete on Codecademy. These points signify the user's progress, but do not determine how rewards are distributed by themselves. Users earn achievements by completing a specific number of exercises and completing projects and courses. All of the achievements in Codecademy have a user-invoked completion trigger (i.e. the user triggers the achievement with an action, such as completing 100 exercises).

The purpose of Codecademy is to teach people who are not familiar with programming how to code. Codecademy features a user interface that resembles that of a programming terminal, but motivates the user with points and badges for completing exercises. The reward system differentiates Codecademy from a programming terminal; the points and badges reward the user for completing exercises, whereas a programming terminal does not reward the user for completing the same exercises.

Khan Academy (2006) is an e-learning platform that teaches topics from the sciences and humanities, such as biology, chemistry, finance, and history. The virtual interface Khan Academy primarily consists of YouTube videos to teach its topics; and a questionnaire application, where users answer multiple-choice questions that are related to the topic they are studying, or fill in a number to solve a problem, if they are studying maths. The physical interface consists of a keyboard and a mouse to submit the answers. When the user answers 10 consecutive questions correctly, he or she becomes 'proficient' in a skill, which means he or she completes the skill.

As an e-learning platform that uses gamification, Khan Academy uses *goals* and a *reward system* that consists of *points* and *achievements*. The endogenous goal of Khan Academy is to complete the exercises. However, Khan Academy also features a goal-setting application, which allows the user to create goals for him- or herself. These goals consist of watching videos or completing skills. The goal-setting application allows the user to create an endogenous goal that corresponds with an exogenous goal.

Users earn energy points by watching videos and spending time on exercises (n.b. this means the user does not need to solve the exercise to earn points). Users earn badges by achieving proficiency in specific numbers of skills, earning specific numbers of energy points, and achieving proficiency in specific skills, among others. There are six different types of badges: meteorite, moon, earth, sun, black hole, and challenge patch. The first five types correspond with increasingly difficult completion logics (i.e. a moon badge can be earned by achieving proficiency in 1 skill; a sun badge can be earned by achieving proficiency in 100 skills). Challenge patches are earned for achieving proficiency in specific sets of skills.

Stack Overflow (2008) is an e-learning platform that teaches players how to program. The virtual interface of Stack Overflow consists of a list of questions asked by other users, which the user can answer, and an application that allows the user to ask questions. The questions are tagged with tags that signify the programming language and other aspects of the problem; the users have badges that signify their achievements within the interface of Stack Overflow. The user can also 'favorite' a question or reward a user with reputation points within the interface. If a user accrues specific numbers of reputation points, he or she unlocks increasingly advanced moderator privileges. The physical interface consists of a keyboard and a mouse to ask and answer questions.

As an e-learning platform that uses gamification, Stack Overflow uses *goals* and a *reward system* that uses *points*, *levels*, and *achievements*. Stack Overflow does not use endogenous goals, as there are no goals that are made explicit in the rules. The user brings his or her own goals to Stack Overflow, which means it does have exogenous goals.

Users earn reputation points by receiving them from other users. The purpose of reputation points is to reward players for submitting questions and answers the user regards as good, and determine when moderation tools and privileges are unlocked. Accruing specific numbers of reputation points unlocks levels of moderation tools and privileges, which means a user can access, create, and edit content that other users with fewer reputation points cannot. Users earn badges as achievements by invoking completion triggers such as leaving specific numbers of comments, or accruing specific numbers of reputation points for questions, among others.

The purpose of Stack Overflow is to allow users to ask and answer programming questions. However, Stack Overflow differentiates itself from a discussion forum by means of its reward system. Because reputation points are user-generated, the users directly influence who has access to moderator privileges and who receives specific achievements.

Perflectie [4] (2012) is an e-learning platform that teaches players how to change their behavior and to develop skills such as active listening. This is accomplished by creating a development goal. The virtual interface consists of a dashboard where the user can track and record his or her progression towards reaching the development goal. The physical interface consists of a keyboard and a mouse. Perflectie is a multi-user platform; the user creates a development team, which consists of people who offer the user feedback and directly influence the progression of the user.

As an e-learning platform that uses gamification, Perflectie uses *goals* and a *reward system* that uses *points*, *levels*, and *achievements*. The purpose of Perflectie is to create a development goal, which is an endogenous goal that corresponds with an exogenous goal. The user creates a number of levels, which correspond to skills that are related to the development goal (e.g. a user whose development goal is to develop active listening may have a level to develop maintaining eye contact). The user rates these levels on their difficulty and starts with the level with the least difficulty. To progress, the user completes levels of increasing difficulty. When the user completes the last level, the user accomplishes his or her development goal.

The user and the user's development team can reward the user with up to 5 points per day. These points address when a player completes his or her current level. The user needs to earn at least 4 points per day in 5 consecutive days. During these 5 consecutive days, the user needs to earn 5 points at least twice. If the user triggers this completion trigger, he or she completes his or her current level and progresses to the next level. If the user completes the last level, he or she accomplishes the development goal. The user earns badges as achievements for completing levels and for completing a development goal.

There are some similarities and differences in the game design elements used by the e-learning platforms. All of the e-learning platforms use endogenous goals and a reward system that consists of points and achievements. In Codecademy and Khan Academy, points are used to compare progress with other users and to unlock achievements; in Stack Overflow and Perflectie, points determine when the user progresses to the next level. Stack Overflow and Perflectie use levels, but use them differently; where levels unlock moderator privileges in Stack Overflow, they represent the user's

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[4] Perflectie is still in its development phase. The game design elements used in Perflectie as described in this thesis may differ from the game design elements used when it is released.

progression towards his or her development goal in Perflectie. In all e-learning platforms, achievements are used to signify the user's progress. Only Codecademy uses tutorials. The user interface of Codecademy resembles that of a programming terminal, which may be perceived as complex depending on the user's experience with programming terminals. This may explain why Codecademy is the only e-learning platform to use tutorials. Finally, Khan Academy and Perflectie allow the user to create endogenous goals that correspond with the user's exogenous goals.

None of the e-learning platforms use diegetic goals. This may be explained by the absence of narrative in these e-learning platforms. Furthermore, none of the e-learning platforms use leaderboards, even though the point systems of Codecademy and Khan Academy are used to compare progress. Why these e-learning platforms do not use leaderboards, remains an open question.

4. USER EXPERIENCE OF GAMIFICATION IN E-LEARNING

The third important concept in this thesis is user experience. Before the user experience of gamification in the e-learning platforms of the case studies can be investigated, the relevant theories and concepts have to be presented and discussed. These theories and concepts will be used to study how the users of the e-learning platforms experience this gamification.

This chapter will present and discuss self-determination theory (Deci & Ryan, 2000). Furthermore, this chapter will investigate the discussions on gamification of e-learning by James Paul Gee (2008) and Rick Raymer (2011).

The purpose of this chapter is to present the theories and concepts of user experience. The theories and concepts presented in this chapter will be applied to investigate the user experience of the users of the case studies. Furthermore, they will be compared with the findings from the case studies to answer the research question. This chapter will answer the following subquestion:

• *How do users experience gamification according to existing literature?*

4.1 User experience of gamification in literature

The existing literature on gamification uses a number of theories and concepts to describe how users experience gamification. The interviews of the case studies can be compared with these theories and concepts to provide an answer to the research question that is grounded in existing literature. The existing literature most commonly refers to self-determination theory.

S*elf-determination theory* was developed by psychologists Edward Deci and Richard Ryan. Self-determination theory distinguishes between intrinsic motivation, "which refers to doing something because it is inherently interesting or enjoyable" (Deci & Ryan, 2000, p. 55), and extrinsic motivation, "which refers to doing something because it leads to a separable outcome" (ibid.). The concepts of extrinsic and instrinsic motivation can be used to explain the user's motivation to accomplish endogenous and exogenous goals (Montola, 2005): endogenous goals are made explicit in the rules and lead to a separable outcome (extrinsic motivation), where exogenous goals are brought to the game by the player because the player regards them as inherently interesting or enjoyable (intrinsic motivation).

Intrinsic motivation has three factors, which are studied in a subtheory called cognitive evaluation theory: feelings of competence, a sense of autonomy (in contrast to being controlled), and relatedness (i.e. being related to a larger social group). These factors can be influenced through rewards, communications, and feedback to increase the intrinsic motivation towards a particular

activity. This can be used to explain the key role that exogenous goals, points, and achievements play in the e-learning platforms discussed in the previous chapter. Exogenous goals are goals brought to the game by the player, which facilitates a sense of autonomy; points and achievements are rewards that signify the player's progress (Wang & Sun, 2011), which facilitate feelings of competence.

Deci, Koestner, and Ryan (1999) performed a meta-analysis on the effects of extrinsic rewards on intrinsic motivation. This meta-analysis consisted of comparing, contrasting, and combining the results of 128 studies on this topic to observe patterns in the similarities and differences between these studies. The authors found that studies show that extrinsic rewards tend to undermine self-regulation, which may be detrimental in the long term. Furthermore, the use of extrinsic rewards is often associated with surveillance, evaluation, and competition, which undermine intrinsic motivation. Finally, the authors conclude that a focus on extrinsic rewards may diminish intrinsic motivation. This means that an e-learning platform that uses extrinsic rewards in the content of gamification may undermine motivation if the platform does not take the potentially negative effects of surveillance, evaluation, and competition into account.

Ryan, Scott, and Rigby (2006) performed four experiments to study self-determination theory in video games. The authors found that there is a significant correlation between fun and the factors of intrinsic motivation (competence, relatedness, and autonomy). Although the authors studied video games, it can be argued that the use of game design elements in non-game contexts can also contribute to the player's sense of fun, because game design elements such as exogenous goals, points, and achievements facilitate these factors of intrinsic motivation for the player.

Game designers often refer to this theory to explain why gamification works (Werbach & Hunter, 2012, Zichermann & Cunningham, 2011). These theories and concepts emphasize the importance of endogenous and exogenous goals, feedback — by means of the reward system — and player interaction. Consequently, these factors are presented to explain how gamification serves its purpose. There are additional factors that play a role in the gamification if it is used in the context of e-learning.

4.2 User experience of gamification in e-learning in literature

There are currently relatively few studies that investigate how users experience gamification in e-learning. In existing studies on gamification in e-learning (Gåsland, 2011; Kelle, 2012; Mellstrand & Frang, 2012; van Bree, 2013; van Staalduinen, 2012), research on serious games is often interpreted and applied to gamification when research on gamification is not available. Serious

games and gamification are used to accomplish the same goal in the context of e-learning: promoting learning in the player based on specific learning objectives (Mayer, 2011). Furthermore, although they are on opposite spectrums of the whole/parts dimension (Deterding et al., 2011), they do use games (full-fledged games and game design elements, respectively). Therefore, research on user experience in serious games in e-learning may be used as a starting point for research on user experience in gamification of e-learning. There are currently two e-learning designers who discuss the gamification of e-learning and the experience it generates: James Paul Gee and Rick Raymer.

E-learning designer James Paul Gee (2008) argues there are five conditions that an experience must meet to be useful for learning. First, "experiences are most useful for future problem solving if the experience is structured by specific goals" (2008, p. 21). Gee argues that people "store their experiences best in terms of goals, and how these goals did or did not work out" (ibid.). This means goals allow the user to learn from experience. Second, experiences have to be interpreted before the user can learn from them. Gee defines interpreting in this context as "thinking […] about how our goals relate to our reasoning in the situation" (ibid.). Third, users need immediate feedback to "recognize and assess their errors and see where their expectations have failed" (ibid.). This means that the user also gets information about their activity from others, rather than only from their interpretations. Fourth, learners need to apply their experiences and interpretations to new situations, which allows them to compare their interpretations of experiences in different contexts. Finally, "learners need to learn from the interpreted experiences and explanations of other people, including both peers and more expert people" (ibid.). Gee claims that "social groups exist to induct newcomers into distinctive experiences, and ways of interpreting and using those experiences, for achieving goals and solving problems" (ibid.). This is comparable to the concept of relatedness in self-determination theory (Deci & Ryan, 2000), as a learning experience would induct users into a larger social group.

E-learning designer Rick Raymer (2011) discusses a number of game design elements that can be used in the gamification of e-learning: goals and reward systems. Raymer suggests that goals in e-learning should be subdivided into smaller goals, similar to goals in games. This allows the user to recover from the effort he or she invests in reaching goals, which consequently allows him or her to invest the same amount of effort in reaching a next goal. Furthermore, Raymer argues these goals should increase in difficulty as the user progresses, which allows the user to learn from increasingly difficult challenges.

Raymer argues that, to regard a reward as meaningful, the user must both want and like a reward. Wanting a reward is comparable to extrinsic motivation, as the user wants a reward because of the

separable outcome associated with the reward; liking a reward is comparable to intrinsic motivation, as the user wants a reward because it is inherently interesting or enjoyable (Ryan & Deci, 2000). This means an e-learning platform is more likely to generate positive experiences if it facilitates feelings of competence, a sense of autonomy, and a sense of relatedness.

There are some similarities and differences between the discussions by Raymer and Gee. Both discuss the importance of goals and feedback in the context of gamification in e-learning, which are also discussed in the theories and concepts in section 4.1. However, Raymer discusses rewards in addition to goals and feedback, where Gee discusses interpreting and applying experiences and learning from other users. This implies Raymer prefers to facilitate the user's intrinsic motivation, where Gee focuses on making experiences useful for learning.

5. USER EXPERIENCE OF GAMIFICATION IN KHAN ACADEMY AND PERFLECTIE

This chapter will investigate the game design elements used by Khan Academy and Perflectie by means of a semiotic analysis and semi-structured interviews with the users. The semiotic analysis of the game design elements will be conducted using the ludic semiotic framework (Lindley, 2005) described in section 1.4, which will focus on how the game design elements used in the case studies generate meaning. Furthermore, this chapter will present and discuss the findings of the semi-structured interviews with the users of Khan Academy. The interview questions were developed using the MDA framework (Hunicke, LeBlanc, & Zubek, 2004) and the CEGE model (Gámez, 2009) described in section 1.5. Finally, this chapter will compare, contrast, and combine the theories and concepts from chapter 4 with the semiotic analysis and the interviews.

The purpose of this chapter is to conduct an exploratory investigation of how users experience the gamification of the case studies. The findings of this chapter will be used to answer the research question. This chapter will answer the following subquestion:

- *How do users of Khan Academy and Perflectie experience the gamification of e-learning?*

5.1 Semiotic analysis of game design elements

Khan Academy uses *goals* and a *reward system* that consists of *points* and *achievements*. As a ludic system, Khan Academy seems to have a negligible discourse level, because there is not an explicit narrative.

Khan Academy uses endogenous goals (i.e. complete the exercises) and exogenous goals (i.e. the user wants to learn about finance). Furthermore, Khan Academy has a goal application that allows the user to create endogenous goals that correspond with his or her exogenous goals. The endogenous goals generate meaning on the simulation level and the performance level. On the simulation level, the endogenous goals generate meaning by addressing how the reward system distributes points and achievements. The endogenous goals that correspond with the user's exogenous goals generate meaning by addressing what the player wants from the learning experience. On the performance level, the endogenous goals address the conditions that must be met to achieve proficiency.

The user earns energy points in Khan Academy by watching videos and spending time on exercises. Energy points signify the time and effort the user has invested in these activities. They generate meaning through this process of signification. Furthermore, the energy points address when the user earns achievements and which achievements he or she earns. If earning an

achievement is an endogenous or exogenous goal for the user, energy points may also generate meaning by signifying the user's progression towards that achievement.

The user earns achievements in Khan Academy by triggering their user-invoked completion logic. Achievements signify that the user has accomplished an endogenous goal. The type of badge associated with an achievement also signifies how much time and effort the user had to invest to earn an achievement (i.e. a sun badge may generate more meaning because a significantly greater amount of time and effort is needed to earn a sun badge than is needed to earn a meteorite badge). Achievements generate meaning through this process of signification.

Perflectie uses a marginally different set of game design elements: *goals* and a *reward system* that uses *points*, *levels*, and *achievements*. As a ludic system, Perflectie seems to have a negligible discourse level, because there is not an explicit narrative.

The purpose of Perflectie is to create the development goal, which consists of what the user wants to learn by means of Perflectie and which is the finishing goal of the e-learning platform. The development goal an endogenous goal that corresponds with an exogenous goal. Furthermore, the user creates goals that correspond with the levels of the development goal. The development goal generates meaning because it addresses the motivation why the user uses Perflectie.

The levels, which are also created by the user, correspond directly with the user's progression towards the development goal. This means they are endogenous goals in themselves. They generate meaning by addressing and signifying the user's progression in the e-learning platform. Furthermore, because the levels increase in difficulty as the user completes more levels, they generate meaning by facilitating an increasingly challenging experience for the user.

The user's progress in his or her current level is rated on a day-to-day basis on a scale of 1 to 5 points, where 1 is the lowest and 5 is the highest. The user is rated by him- or herself and his or her development team. Due to the rules of Perflectie, the points do not directly signify the user's progress; instead, they represent the user's progress on a specific day, and if this progress is sufficient over a period of five days (i.e. if the user earns a sufficient number of points), the user progresses to the next level. This means the points in Perflectie generate meaning by addressing whether the user's progress on a specific day is sufficient for him or her to progress to the next level.

The user-invoked completion logic of the achievements in Perflectie is completing a level or accomplishing the development goal. This means they generate meaning by signifying that the player has triggered the corresponding completion logic.

There are some similarities and differences in the game design elements used in Khan Academy and Perflectie. Both e-learning platforms allow the user to create endogenous goals that correspond

with the user's exogenous goals. However, in Perflectie, levels play a key role in the user's progression through the e-learning platform, where the goals of achieving proficiency in skills in Khan Academy are not connected to other skills. Finally, the energy points in Khan Academy signify the time and effort the user has invested in watching videos and doing exercises, where the points in Perflectie represent the user's progress on a specific day.

The game design elements used by Khan Academy and Perflectie generate meaning. How the users of these e-learning platforms experience this meaning will be investigated by means of interviews.

5.2 Interviews with creators and users

To further investigate how users of Khan Academy and Perflectie experience the gamification of these e-learning platforms, semi-structured interviews have been conducted with the users of these platforms and with the creators of Perflectie. The interviews have been conducted face-to-face in public settings. The interviewed users include the 2 creators of Perflectie, 2 users of Perflectie and 6 users of Khan Academy. The creator of Khan Academy, Salman Khan, was not available for face-to-face interviews. 2 users were female and 8 users were male. 1 user was German, 1 users was British, 1 user was Greek, and 7 users were Dutch. The German, British, and Greek users were interviewed in English, and the Dutch users were interviewed using in Dutch.

To guarantee a broad range of interviewees, I have selected users from 4 different universities in the Netherlands — Rijksuniversiteit Groningen, Hogeschool Utrecht, Fontys Hogeschool Eindhoven, and Maastricht University — who study different disciplines, such as psychology, international relations, and arts. The diversity of the interviewees means that they are likely to study an equally diverse range of subjects on the e-learning platforms, which may influence their experience. However, this thesis will focus on the experience of gamification of e-learning platforms, rather than the content of e-learning platforms. The users' experiences of gamification are less likely to be influenced by their disciplines than their experiences of the content. These interviews have been conducted with the questions developed using the MDA framework and the CEGE model, as discussed in section 1.5.

The users of Khan Academy can be divided into two groups: the users who were not interested in the reward system and those who were. Sarah (2013) is a student of the Arts & Heritage master's programme at Maastricht University who uses Khan Academy for her studies. She did not realize Khan Academy used a reward system because she accessed the videos from YouTube. This means she did not interact with the reward system. As a result, she claims using the platform "felt more

like a video than a game" (ibid.). Although Sarah didn't interact with the reward system, she felt that the learning experience was rewarded by "her own satisfaction and motivation" (ibid.). However, Sarah also expressed frustration because of the user interface of YouTube. She claims that the videos feel disjointed, because she couldn't go back to previous videos in lecture series.

Bjorn (2013) is a student of the Psychology bachelor's programme at Fontys Hogeschool who uses Khan Academy for his studies., also didn't realize Khan Academy used a reward system. He claims that he "never read anything about the rules [of the reward system]." (ibid.). However, he has interacted with the achievements, as he claims that "you regularly get small rewards and encouragements to continue" (ibid.). The rewards he refers to are the achievements, which are shown to the user as he or she earns them.

Janina (2013) is a student of the Arts & Culture and European Public Health bachelor's programmes at Maastricht University who uses Khan Academy for her studies. Janina realized that Khan Academy uses points and achievements, but she was not interested in them. She claims she "did it for the videos themselves, not the badges" (ibid.). Furthermore, she also felt that the rules were inconsistent with her expectations, as "some badges were easier to earn than others" (ibid.). Like Sarah, Janina felt that "the main reward was the lesson itself" (ibid.).

Dimitris is a student of the Media Culture master's programme at Maastricht University who uses Khan Academy for his personal interest. Dimitris was interested in the reward system of Khan Academy, in contrast to Sarah, Bjorn, and Janina. He created an account at Khan Academy, as he felt he would lose the points he had earned if he did not create an account. Furthermore, he felt he could access additional material if he created an account. Although Dimitris was interested in the reward system, he also argued that "points and badges make no sense if they aren't incorporated into larger whole of online community" (ibid.). Furthermore, Dimitris expressed frustration because of the user interface of YouTube, which facilitates distraction according to him. He argues that the user interface of YouTube shows videos that are not by Khan Academy, which means he may be distracted by watching these videos.

Jimmy (2013) is a student of the Health Sciences bachelor's programme at Maastricht University who uses Khan Academy for his studies. Jimmy was interested in the reward system of Khan Academy. However, he expresses frustration because he feels the points earned do not correspond with the length of the video: "That doesn't feel fair." (ibid.) This means the distribution of rewards is not consistent with his expectations. Jimmy feels he is not rewarded by the reward system, but by the content of Khan Academy: "Watching the movies is great because there's always something that

interests you. You earn rewards for watching more videos, but I wouldn't watch videos that don't interest me." (ibid.)

Jimmy and Dimitris claimed that the content of Khan Academy was more important to them than the reward system (i.e. the points and achievements), Bjorn and Janina weren't interested in the reward system, and Sarah didn't interact with the reward system. This means that, according to the interviewed users, the content is more important than the reward system in Khan Academy. Jimmy, Dimitris, and Janina were interested in the endogenous goals of Khan Academy (i.e. the goals made explicit in the rules, Montola, 2005), but claimed that their exogenous goals were more important to them; Bjorn and Sarah were not interested in these goals. This means that the interviewed users regarded their exogenous goals as more important than the system's endogenous goals. All interviewed users of Khan Academy claim that the learning experience is a reward in itself. All interviewed users, except Dimitris, used Khan Academy for their studies, which implies that they had clear exogenous goals whilst using the e-learning platform. They also felt solely responsible for their progress.

This means that they display a substantial degree of ownership (Gámez, 2009) and intrinsic motivation (Ryan & Deci, 2000). However, it also means that the users seem to neither want or like the points and achievements as rewards, which means they don't experience them as rewarding (Raymer, 2011). Jimmy's frustration with the correlation between the length of the videos and the amount of points earned also indicates that the reward system can frustrate users, rather than motivating them.

Furthermore, the users expressed frustration regarding the user interface of Khan Academy. Dimitris, Sarah, and Jimmy did so because of the low resolution of the videos. Furthermore, Sarah also expressed frustration because she couldn't go back to previous videos, and Jimmy did so because he felt the number of points earned did not correspond to the time spent watching the videos.

Of all the interviewed users, only Jimmy claimed that he experienced challenge and expression (Hunicke, LeBlanc, & Zubek, 2004). However, he claimed that he experienced these components of fun because of the content, and not because of the game design elements. Regarding experiencing challenge and expression, he claims: "You're being challenged intellectually, you gather new insights. You don't really express yourself in Khan Academy but you do develop a different view of things." (Jimmy, 2013)

The creators and users of Perflectie had relatively consistent experiences in their use of the e-learning platform compared with each other. Jochem (2013), one of the creators of Perflectie, uses

the platform with the development goal of learning to confront people. He argues that the points used in Perflectie are fair if they are distributed by means of an objective standard. Due to this, he expressed frustration, because he was unsure whether to distribute sufficient points to another user to allow him to complete a level. "It's difficult to decide when you're really ready for the next level." (ibid.) He expressed the same feeling when he was in a level for a longer time than he expected. However, Jochem felt that although he only used the platform for a few moments per day, he was working on progressing through his current level throughout the day. Finally, Jochem felt that the achievements for completing levels were not necessary: "Completing a level is a reward in itself." (ibid.)

Stefan (2013), the other creator of Perflectie, uses Perflectie with the development goal of learning how to be more discreet. Stefan expresses frustration when he observes that he isn't earning sufficient points to complete a level. He feels that the reward system used in Perflectie is fair because it represents how the development team experiences the user's development on a specific day. "It's difficult when someone else uses their judgment, but that's also how discussions arise." (ibid.) Stefan experiences these discussions as a positive consequence. "Everything goes faster if you give open feedback [in a discussion]." (2013) Furthermore, he argues that the achievements offer motivation, but completing the level is the reward in itself.

Matthijs (2013), a student of the Digital Communication bachelor's programme at Hogeschool Utrecht, uses the platform with the development goal of learning how to actively listen. Matthijs claims that the user interface of Perflectie is motivating, as it displays his progression by means of his achievements: "The dashboard is really neat because it shows your badges." (ibid.) However, he feels the motivation from his development team and the learning experience were more significant rewards than the achievements themselves, which he does not consider necessary. Matthijs also claims his development team plays a key role in his use of Perflectie, as he considers "whether they agree with my progress" (ibid.).

Daan (2013), a student of the International Relations bachelor's programme at Rijksuniversiteit Groningen, uses Perflectie with the development goal of learning how to actively listen. However, Daan does not have a development team, which means that only he distributes the points that address when he completes a level. Daan claims he rarely uses the user interface to check his progression: "It isn't interesting if you don't have a development team." (ibid.) He expresses frustration because he occasionally distributed a lesser number of points than he currently thinks he should have earned, which he felt delayed his progression: "I was too critical of myself." (ibid.) Daan claims that the progression was a more significant reward than the reward system itself.

Finally, he claims that he misses the addictiveness of games in Perflectie, which he feel would motivate him to work more on his development goal when he isn't motivated.

All of the interviewed users of Perflectie claim the learning experience is more important than the reward system. Furthermore, Jochem and Matthijs claimed that the reward system was not a necessary element of Perflectie. However, Stefan and Matthijs claimed that the achievements did provide motivation, even though they felt the learning experience in itself was more important. Nonetheless, Jochem, Stefan, and Daan thoroughly discuss points and how they affect them. They discuss how the number of points reflects how a person perceives their performance on a specific day and how this influences their progression through a level. Stefan expresses anxiety over not earning a sufficient number of points to progress: "I hope [my development team] scored me well, I hope I don't get 3 points or lower." (2013) This displays a substantial degree of ownership (Gámez, 2009), as the interviewed users seem to take responsibility for their actions by correlating their performance with the points they earn. Furthermore, it means that the users want and like the points as rewards (Raymer, 2011).

When the interviewed users of Perflectie referred to their development goals, they referred to them as their endogenous and exogenous goals simultaneously (i.e. the goals made explicit in the rules of Perflectie and the goals brought to the activity by the user, Montola, 2005). This implies that, for the interviewed users, the endogenous development goal corresponds directly with the exogenous development goal. Because the interviewed users feel their endogenous and exogenous goals correspond to such a degree, they display a substantial degree of intrinsic motivation (Deci & Ryan, 2000). However, the interviewed users only referred to the levels as obstacles they had to overcome to progress towards their development goal. This means they regard the levels as endogenous goals, but not as endogenous goals, which implies they do not have the same degree of intrinsic motivation to complete levels.

Some of the interviewed users of Perflectie claimed that they experienced expression and fellowship (Hunicke, LeBlanc, & Zubek, 2004) by interacting with their development team. Jochem and Stefan argue that providing open feedback by means of the user interface allow them to express themselves. Jochem, Stefan, and Matthijs further claim that Perflectie facilitates discussions with their development teams, as they feel the points they earn on a specific day can be used to start a discussion. The facilitation of discussions implies that Perflectie may also facilitate relatedness (Deci & Ryan, 2000), as the users feel related to the larger social group of their development team.

There are some similarities and differences between the claims of the interviewed users of Khan Academy and Perflectie. Most of the users of the e-learning platforms claim they are not interested

in the reward systems of their respective platforms. The interviewed users who do claim they are interested still argue the learning experience is more important to them. This means the users want and like (Raymer, 2011) the rewards to a relatively low extent.

Nonetheless, the interviewed users of Khan Academy and Perflectie experienced the points of their respective platforms substantially differently. Where only two users of Khan Academy (Dimitris and Jimmy) were interested in the points, three users of Perflectie (Jochem, Stefan, and Matthijs) felt that the number of points they earned directly corresponded with (their development team's perception of) their performance.

The users of the e-learning platforms experienced their respective e-learning platform's endogenous goals relatively differently. On the one hand, the interviewed users of Khan Academy claimed they were not interested in the endogenous goals or argued that their exogenous goals felt more important to them. On the other hand, the interviewed users of Perflectie did not differentiate their development goal as an endogenous goal or an exogenous goal; to these users, the development goal was both simultaneously. However, the interviewed users experienced the levels as endogenous goals.

Finally, the users of the e-learning platforms experienced their respective components of fun (Hunicke, LeBlanc, & Zubek, 2004) differently. Jimmy, as a user of Khan Academy, claimed he experienced challenge and expression by means of the content of the e-learning platform, and not the game design elements. Jochem and Stefan, as users of Perflectie, claimed they experienced expression and fellowship because the feedback system facilitated discussions.

5.3 Comparison of literature, analysis, and interviews

The findings from the literature review, the semiotic analysis, and the semi-structured interviews with the users can be compared, contrasted, and combined to investigate how the interviewed users experience the use of game design elements (i.e. the gamification) in their respective e-learning platforms.

Khan Academy uses *goals* and a *reward system* that consists of *points* and *achievements*. The semiotic analysis of the game design elements of Khan Academy found that the endogenous goals generate meaning by addressing the distribution of the reward system, and the exogenous goals do so by addressing what the player wants from the learning experience. Furthermore, Gee (2008) claims that goals structure the learning experience.

The exogenous goals of all interviewed users, except Dimitris, were related to their studies. Sarah and Bjorn were not interested in the endogenous goals of Khan Academy; Jimmy, Dimitris,

and Janina were interested in the endogenous goals, but claimed that the learning experience (i.e. their exogenous goal) was more important to them. This means these goals were not as meaningful to the interviewed users as the learning experience. Furthermore, the interviewed users claimed they watched the videos in a structure based on their exogenous goals, rather than the platform's endogenous goals: "I wouldn't watch videos that don't interest me." (Jimmy, 2013)

The points in the reward system generate meaning by signifying the time and effort the user has invested in the e-learning platform; the achievements generate meaning by signifying the user has accomplished an endogenous goal. In accordance with Deci & Ryan (2000), rewards are feedback that facilitate a sense of competence. Gee (2008) also emphasizes the importance of feedback in the learning experience to recognize the successes and failures of the learning experience. However, according to Raymer (2011), users have to want and like rewards to regard them as meaningful.

Bjorn, and Sarah were not interested in the reward system; Janina, Jimmy, and Dimitris were interested, but claimed the learning experience was more important to them. This means the rewards were not as meaningful to the interviewed users as the learning experience. However, the reward system did motivate Dimitris to create an account to not lose points, which means the points were sufficiently meaningful for him to do so. Furthermore, Janina and Jimmy expressed frustration regarding the reward system, which means that even though the reward system was not as important to them, it did influence their experience of the e-learning platform, albeit negatively. This means that the points can demotivate users if they feel the points do not correspond with the effort they invest in the e-learning platform.

Perflectie uses *goals* and a *reward system* that consists of *points*, *levels*, and *achievements*. The semiotic analysis of the game design elements found that the goals generate meaning because they address the user's motivation to use the e-learning platform. The correspondence of the endogenous goals with the user's exogenous implies that the development goal generates and facilitates intrinsic motivation (Deci & Ryan, 2000). Furthermore, the user's role in creating the development goal implies it also facilitates a sense of autonomy (ibid.) and ownership (Gámez, 2009). The interviewed users regard their development goal as wholly their own, which means that they do experience a substantial sense of autonomy and ownership in using Perflectie because of their development goal.

The levels in the reward system generate meaning by signifying the user's progression towards the development goal and by functioning as endogenous goals in themselves. They subdivide the development goal into smaller goals (Raymer, 2011). This means they structure the learning experience (Gee, 2008). The interviewed users regarded the levels as endogenous goals, in contrast

with the development goals, which they regarded as endogenous and exogenous goals. This implies that they structure the learning experience for the interviewed users, but do not facilitate intrinsic motivation as the development goal does. Nonetheless, Jochem and Stefan claim that completing a level is a reward. This implies the users do regard completing a level as meaningful.

The points in the reward system generate meaning by addressing when the user completes a level and consequently how the user progresses towards the development goal. In Perflectie, the points are distributed by users, which means the feedback from points may generate feelings of both competence and relatedness (Deci & Ryan, 2000). In addition, Gee (2008) claims this feedback is important in the learning experience to recognize successes and failures. Jochem, Stefan, and Matthijs directly correlate the point they earn with (their development team's perception of) their performance. This implies that they experience a substantial sense of ownership. It also means that it generates feelings of competence if the user earns 4 or 5 points. If the user earns 3 or less points, this means he or she cannot complete their current level in the next 5 days, which may demotivate the user, as argued by Daan. Stefan expresses his anxiety over earning 3 or less points. This means the users experience them as meaningful, regardless of the number of points earned.

The achievements in the reward system generate meaning by signifying that the user has completed a level or accomplished the development goal. Jochem and Daan claim that achievements are not necessary, but Stefan and Matthijs claim that achievements motivate them. However, the users claim they are motivated more by progressing to the next level and by the learning experience itself. This means the achievements are feedback that facilitate a sense of competence (Deci & Ryan, 2000).

The difference in how the users experience the reward systems of Khan Academy and Perflectie may be explained by the role they play in the user's progression. In Khan Academy, the reward system does not influence the user's progression; the videos the user wants to watch are available to the user regardless of the rewards he or she has earned. The information in these videos is the exogenous goal of the user of Khan Academy. However, in Perflectie, the reward system does influence the user's progression, as the number of points a user earns addresses when that user progresses to the next level. Progressing through the levels also means progressing towards the development goal, which is the exogenous goal of the player. This means that users may experience game design elements as more meaningful if they address the user's progression.

6. CONCLUSION

The research focus of this thesis is an exploratory investigation of user experience of gamification in e-learning. This thesis has presented a literature review on gamification, e-learning, and user experience, a semiotic analysis of game design elements, and a series of interviews with users of e-learning platforms that use gamification. This chapter will summarize the findings of the literature review and the exploratory investigation of this thesis, answer the research question, discuss the limitations of the methodology, and argue how the findings can be used for further research. This chapter will answer the research question:

• *How do users experience the gamification of e-learning?*

6.1 Summary

This thesis used three methods to answer the research question: a literature review, semiotic analysis of game design elements, and semi-structured interviews with users of e-learning platforms. The semiotic analysis and semi-structured interviews were conducted with game design elements and users of Khan Academy and Perflectie. Khan Academy and Perflectie used goals and reward systems as game design elements; Khan Academy's reward system consisted of points and achievements, and Perflectie's reward system consisted of points, levels, and achievements.

The literature review studied self-determination theory (Deci & Ryan, 2000) and the discussions on gamification in e-learning by Gee (2008) and Raymer (2011). In accordance with self-determination theory, the reward system functions as a feedback system that facilitates the user's feelings of competence. Gee argues that goals structure the user's experience and feedback allows the user to assess his or her successes and failures in the context of an e-learning platform. Raymer argues that goals should be subdivided into smaller goals to allow the user to recover from the effort he or she invests into the e-learning platform. Furthermore, he argues that a user must want and like a reward in order to experience it as meaningful.

The semiotic analysis showed that goals can be endogenous (i.e. made explicit in the rules, Montola, 2005) or exogenous (i.e. brought to the activity by the player, ibid.). The exogenous goals generate meaning by addressing the user's motivation for using the e-learning platform; the endogenous goals generate meaning by addressing the rules for the reward system. The reward system generates meaning by motivating the player with rewards. Points, levels, and achievement generate meaning by signifying progress.

The findings from the literature review and the semiotic analysis were compared with the findings of the semi-structured interviews. All of the interviewed users claimed that the learning experience was more important than the game design elements. However, Janina and Jimmy expressed frustration when they did not receive the rewards they felt they earned by using Khan Academy. Furthermore, Stefan expressed anxiety because he might earn 3 or fewer points, which would mean he would not be able to complete the level in the next 5 days, and Jochem and Daan discussed that they felt unsure how many points to distribute at times. This means that, for these users of Perflectie, the points were meaningful. The difference in the experienced meaning of the reward system may be explained by the role the reward system plays in the e-learning platforms. The users of Perflectie experience the reward system as more meaningful, and the reward system also addresses the user's progression.

6.2 Conclusion

The findings show that the interviewed users experiences their exogenous goals as more important than the e-learning platform's endogenous goals. This means that the content of the e-learning platform generates more meaning for the interviewed users than the game design elements. This is in accordance with self-determination theory (Deci & Ryan, 2000), which claims that intrinsic motivation is more meaningful than extrinsic motivation to the user. However, the interviews have shown that game design elements influence the interviewed users' experience.

On the one hand, the feedback generated by the reward system of Khan Academy was not experienced as meaningful because most of the interviewed users claimed they did not want or like the rewards (Raymer, 2011). Some of the interviewed users expressed frustration because they experienced the feedback generated by the reward system to be inconsistent with their expectations. This means that the reward system can generate negative experiences if the rewards are inconsistent with the expectations of the user. This is a factor that may undermine intrinsic motivation, in addition to the factors discussed by Deci, Koestner, and Ryan (1999).

On the other hand, the feedback generated by the reward system of Perflectie positively influenced the interviewed users' experience. This means that rewards can also influence the user by generating feedback based on the user's performance, in addition to the attributes that influence the user discussed by Wang and Sun (2011). Furthermore, although the points of Perflectie could not directly be used to assess and recognize the successes and failures (Gee, 2008), they motivated some of the users to discuss their successes and failures with their development team.

Finally, the interviews with the users of Perflectie show how an endogenous goal that corresponds with the user's exogenous goal influences the user's experience. The interviewed users implied that they were intrinsically and extrinsically motivated to accomplish the development goal. They experienced the points as meaningful, because of the role they played in accomplishing the development goal. This means that game design elements can be experienced as meaningful if they address the endogenous goal, if the endogenous goal corresponds with the user's exogenous goals.

The implications of the findings are that gamification can be used in e-learning to generate feedback or to generate endogenous goals that correspond with the users' exogenous goals. If it is used to generate feedback, it can influence the experience by creating an affordance for the user to recognize and assess successes and failures (Gee, 2008) and to facilitate intrinsic motivation by generating feelings of competence (Deci & Ryan, 2000). However, if the feedback is inconsistent with the user's expectations (i.e. the number of points earned is not consistent with the length of the video being watched, Jimmy, 2013), this feedback may demotivate the user. If it is used to generate endogenous goals that correspond with the users' exogenous goals, they can be used to structure the users' learning experiences (Gee, 2008; Raymer, 2011). These implications can be used as considerations for e-learning designers who consider using gamification in their e-learning platform.

6.3 Limitations and further research

The literature studied and interviews conducted as part of this thesis have a number of inherent limitations. The existing literature on the user experience of gamification in e-learning is relatively scarce, as Gee (2008) and Raymer (2011) seem to be the only authors who explore this topic. However, there is a relative abundance of literature on serious games and on the content and results of e-learning, which can be used to study the user experience of gamification in e-learning if due diligence is exercised. For literature on serious games, this consists of considering the differences between using a full-fledged game or game design elements; for literature on content and results, this consists of how content influences experiences and how results are related to experience.

The semi-structured interviews conducted in this thesis also have limitations. The interview questions were developed using the MDA framework (Hunicke, LeBlanc, & Zubek, 2004) and the CEGE model (Gámez, 2009). However, although the interview questions were developed to diminish the possibility of biases, they have not been tested before they were used in the interviews. This means they may facilitate an unanticipated bias by suggesting an answer or by being prone to misunderstandings.

The number of interviewees is relatively limited, which means that the findings cannot be used to represent the user experience of all users of e-learning platforms. However, the research focus of this thesis is to conduct an exploratory investigation of the user experience of gamification in e-learning platforms. This means that the findings of this thesis can be used to generate hypothesis which can be used to further investigate the user experience of gamification in e-learning.

Furthermore, all interviewees were intrinsically motivated to use the e-learning platforms. This means that the findings from this thesis cannot represent users who are not intrinsically motivated. However, this also means that future work can focus on the user experience of gamification in e-learning of users who are not intrinsically motivated. Because rewards provide extrinsic motivation (Deci & Ryan, 2000), this approach can be used to investigate how users can be extrinsically motivated to use e-learning platforms by means of gamification.

Khan Academy and Perflectie use different means to use game design elements in their e-learning platforms. The game design elements in Khan Academy correspond directly with the learning experience, as the user immediately interacts with the game design elements as he or she interacts with the content. The game design elements in Perflectie expand the session temporally (Montola, 2005), which influences the user experience. Future work can focus on how temporal expansion (and spatial and social expansion) of the learning experience influence user experience.

Finally, Khan Academy and Perflectie did not have an explicit narrative. This means that their ludic systems have a marginal discourse level. Future work can focus on how a narrative can be introduced into an e-learning platform and how such a narrative influences user experience.

7. REFERENCES

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APPENDIX 1: INTERVIEW FORMAT FOR KHAN ACADEMY

Briefing
I am writing a thesis on the use of game design elements in Khan Academy. _Ik schrijf een scriptie over het gebruik van game design-elementen in Khan Academy._
The results of the interview will be used in my thesis. _De uitkomsten van het interview zullen worden gebruikt in mijn scriptie._
The interviewee's identity will not be made public in my thesis. _De identiteit van de geïnterviewde wordt niet bekend gemaakt in mijn scriptie._
During the interview, there are no right or wrong answers. _Tijdens het interview zijn er geen goede of foute antwoorden._

Questions to introduce the participant
Which topics did you study on Khan Academy? _Welke onderwerpen heeft u op Khan Academy bestudeerd?_

Questions CEGE (Gámez, 2009)	Element	Concept	Constituent
Did you understand the rules of Khan Academy? _Begreep u de regels van Perflectie?_		Gameplay	Rules
How fair were the rules of Khan Academy? _Hoe rechtvaardig vond u de regels van Khan Academy?_		Gameplay	Rules
What did you feel whilst using Khan Academy? _Wat voelde u terwijl u Khan Academy gebruikte?_		General GXP	Enjoyment/ Frustration
How do you feel about having used Khan Academy? _Hoe voelt u zich over dat u het Khan Academy heeft gebruikt?_		General GXP	Enjoyment/ Frustration
Would you keep using Khan Academy? _Zou u Khan Academy blijven gebruiken?_		General GXP	Enjoyment/ Frustration
What were you supposed to do to reach your goal? _Wat moest u doen om uw doel te bereiken?_	Puppetry	Control	Goal
Which actions could you perform whilst using the website? _Wat kon u doen terwijl u de website gebruikte?_	Puppetry	Control	Small Actions
How much time did you have to reach your goal? _Hoeveel tijd had u om uw doel te bereiken?_	Puppetry	Facilitator	Time
What do you think about the time you have used Khan Academy? _Hoe denkt u over de tijd waarin u Khan Academy heeft gebruikt?_	Puppetry	Facilitator	Time
To what extent did you receive rewards as you progressed during Khan Academy? _In hoeverre werd u beloond tijdens uw voortgang in Khan Academy?_	Puppetry	Ownership	Rewards
How responsible did you feel for the outcome of Khan Academy? _Hoe verantwoordelijk voelde u zich voor de uitkomst van Khan Academy?_	Puppetry	Ownership	General Ownership

Questions MDA (Hunicke, LeBlanc, & Zubek, 2004)	Layer	Component	
How did Khan Academy challenge you to learn? _Hoe daagde Khan Academy u uit om te leren?_	Aesthetics	Challenge	
How did you express yourself during Khan Academy? _Hoe heeft u uzelf uit kunnen drukken tijdens Khan Academy?_	Aesthetics	Expression	

APPENDIX 2: INTERVIEW FORMAT FOR PERFLECTIE

Briefing
I am writing a thesis on the use of game design elements in Perflectie. *Ik schrijf een scriptie over het gebruik van game design-elementen in Perflectie.*
The results of the interview will be used in my thesis. *De uitkomsten van het interview zullen worden gebruikt in mijn scriptie.*
The interviewee's identity will not be made public in my thesis. *De identiteit van de geïnterviewde wordt niet bekend gemaakt in mijn scriptie.*
During the interview, there are no right or wrong answers. *Tijdens het interview zijn er geen goede of foute antwoorden.*

Questions to introduce the participant
What is your development goal? *Wat is uw ontwikkeldoel?*
Who is in your development tam? *Wie behoort tot uw ontwikkelteam?*

Questions MDA (Gámez, 2009)	Element	Concept	Constituent
How fair were the rules of Perflectie? *Hoe rechtvaardig vond u de regels van Perflectie?*		Gameplay	Rules
Did you understand the rules of Perflectie? *Begreep u de regels van Perflectie?*		Gameplay	Rules
What did you feel whilst using Perflectie? *Wat voelde u terwijl u Perflectie gebruikte?*		General GXP	Enjoyment/ Frustration
How do you feel about having used Perflectie? *Hoe voelt u zich over dat u het Perflectie heeft gebruikt?*		General GXP	Enjoyment/ Frustration
Would you keep using Perflectie? *Zou u Perflectie blijven gebruiken?*		General GXP	Enjoyment/ Frustration
What were you supposed to reach your development goal? *Wat moest u doen om uw ontwikkeldoel te bereiken?*	Puppetry	Control	Goal
Which actions could you perform whilst using the dashboard? *Wat kon u doen terwijl u het dashboard gebruikte?*	Puppetry	Control	Small Actions
How much time did you have to reach your development goal? *Hoeveel tijd had u om uw ontwikkeldoel te bereiken?*	Puppetry	Facilitator	Time
What do you think about the time you have used Perflectie? *Hoe denkt u over de tijd waarin u Perflectie heeft gebruikt?*	Puppetry	Facilitator	Time
To what extent did you receive rewards as you progressed during Perflectie? *In hoeverre werd u beloond tijdens uw voortgang in Perflectie?*	Puppetry	Ownership	Rewards
How responsible did you feel for the outcome of Perflectie? *Hoe verantwoordelijk voelde u zich voor de uitkomst van Perflectie?*	Puppetry	Ownership	General Ownership

Questions MDA (Hunicke, Leblanc, Zubek, 2004)	Layer	Component	
How did you feel about your interactions with your team? *Hoe voelde u zich over uw omgang met uw ontwikkelteam?*	Aesthetics	Fellowship	
How did you express yourself during Perflectie? *Hoe heeft u uzelf uit kunnen drukken tijdens Perflectie?*	Aesthetics	Expression	