# Chapter 2
# Studying Gamification: The Effect of Rewards and Incentives on Motivation

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## 2.1 Introduction

This chapter focuses on the intersection between two well-researched areas: motivation and game playing. While each area offers a wealth of research insight, the connection between them received modest research attention, a gap we wish to narrow. Interestingly, industry was quicker to identify this gap and offer the new buzzword, gamification. "Gamification" is the use of game elements in non-gaming systems to improve user experience and user engagement, loyalty and fun (Deterding, Khaled, Nacke, & Dixon, 2011; Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011; Lee & Hammer, 2011; Muntean, 2011). In recent years gamification systems were applied in marketing (Muntean, 2011; Shneiderman, 2004) as well as non-business contexts such as politics, health (Lee & Hammer, 2011), or interactive systems (Flatla, Gutwin, Nacke, Bateman, & Mandryk, 2011) and education (Lee & Hammer, 2011; Raban & Geifman, 2009; Rafaeli, Raban, Ravid, & Noy, 2003; Ravid & Rafaeli, 2000). This rapid development has caught the interest of researchers as a potential to create engaging workplaces (Reeves & Read, 2009); facilitate mass-collaboration (McGonigal, 2011) or encourage knowledge contribution (Krause & Smeddinck, 2011; Shneiderman, 2004; von Ahn & Dabbish, 2008).

Gamification is a new concept which is gaining momentum. Fortune magazine capped gamification as the new business concept with a market forecasted to reach over $1.5 billion in 2015 from $97 million in 2011, a rapid increase over the 5 years

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2011–2015 (Konrad, 2011); technology industry research firm Gartner estimates that by 2014 gamified services for marketing and customer retention will become as important as Facebook, eBay or Amazon, and that by 2015, more than 50 % of organizations will gamify their innovation processes (Gartner Group, 2011). Gamification also made it into Oxford's Short List for Word of the Year 2011 (OUPblog, 2011).

In fact, gamification has already become subject to controversy and critique as some influential bloggers (McDonald, 2010; Robertson, 2010; Wu, 2012) emphasized the need for developing gamification systems that create intrinsic motivations rather than replacing them with extrinsic rewards (points and badges). Pointification (Robertson, 2010), gamification backlash (Wu, 2012) or exploitationware (Bogost, 2011) are examples of derogatory labeling.

Serious games are game-based activities designed to promote a desired action such as knowledge sharing (Deterding, Khaled et al., 2011; Deterding, Sicart et al., 2011; Krause & Smeddinck, 2011; von Ahn & Dabbish, 2008). One of the promising directions for the application of gamification is in serious games which is the focus of this chapter. Gamification may also be applied in other contexts such as learning and educational activities; however, our interest is in serious games and their organizational significance. Next we elaborate on the relationship between gamification and serious games.

## 2.2   Gamification and Serious Games

Recent years have seen a wealth of popular and academic publications on serious games and gamification. These terms can be distinct, as we define below, but they are also similar and used interchangeably. In this section we explain the overlap and the distinction between them.

The main goal of games is entertainment, but their universal applicability gave games extra functions in various aspects of everyday life such as training and knowledge sharing in all walks of life: defense, education, scientific exploration, health care, emergency management, city planning, engineering, religion, government and NGOs, business, marketing, communication and politics (Breuer & Bente, 2010; Muntean, 2011; Susi, Johannesson, & Backlund, 2007). This kind of games is known as serious games, and their main purpose is to train, investigate, or advertise (Breuer & Bente, 2010; Muntean, 2011; Susi et al., 2007).

Similarly to serious games, gamification is the application of game elements for purposes other than their expected use for entertainment (Deterding, Khaled et al., 2011; Deterding, Sicart et al., 2011). The boundary between game and artifact with game elements is blurry, personal, subjective and social (Deterding, Khaled et al., 2011). Fold-It[1] exemplifies the blurriness. Some reference it as a successful example of gamification in science. Others view it as a serious game in which players use a

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[1] http://fold.it/portal/

graphical interface to predict protein structures, by using game play to help solve problems that computers cannot solve yet (Khatib et al., 2011; Krause & Smeddinck, 2011; Xu, 2011).

Gamification and serious games are related because both try to leverage aspects of games to achieve something beyond playfulness. Serious games offer an enjoyable way to solve real-world problems. Gamification is also used as a clever way to promote a business or product. For instance, players can earn badges, discounts, and other rewards for visiting real-world shops and "checking-in" to mobile phone applications such as FourSquare. Some other examples are EpicWin which encourages players to complete daily chores, and websites like Google Powermeter that promotes household energy saving through the use of progress bars and collectible badges (Lee & Hammer, 2011).

Gamification attempts to harness the motivational power of games in order to promote participation, persistence and achievements. Prior research on games focused on fun, enjoyment and flow as core components of game play (Garris, Ahlers, & Driskell, 2002; Hsu & Lu, 2004; Malone, 1980, 1981; Sweetser & Wyeth, 2005). Yet understanding how to promote motivation by carefully crafted achievements and rewards functions should be revisited especially in light of the current debate. Moreover, the idea of using game mechanics and dynamics to drive participation and engagement mostly by using extrinsic motivation is worth examination because research suggests that using an extrinsic reward may have a significant negative effect on motivation by undermining free-choice and self-reported interest in the given task (Bielik, 2012; Deci, 1972). In contrast, a recent study of badge systems suggests that negative aspects are mostly attributable to poor design (Antin & Churchill, 2011; Bielik, 2012). Hence, it is still not clear what effect these mostly extrinsic game mechanics have on intrinsic motivation and how exactly they affect motivation, both positively and negatively (Bielik, 2012).

In summary, serious games and gamification are sometimes distinct but often are interchangeable as indicated by the games mentioned in Fig. 2.1. In order to deepen our understanding of the role of rewards and interpretation of players' motivations for engaging and playing, we offer a theoretical model containing a spectrum of motivation theories.
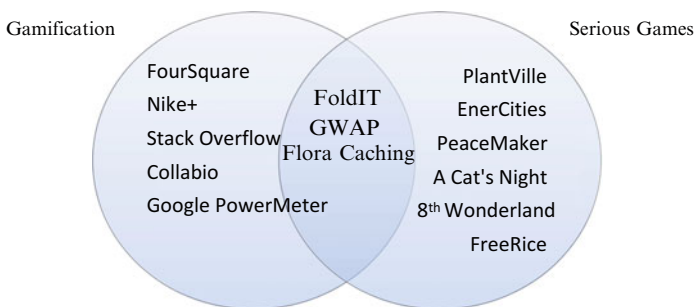


**Fig. 2.1** Relation between gamification and serious games

## 2.3 The Proposed Model of Motivation in Games

Motivation to act has been studied in Social Psychology, Educational Psychology, and Organizational Science. These areas focus on motivation in particular types of environments. We propose to link gamification to these theories.

Motivation is demonstrated by an individual's choice to engage in an activity and the intensity of effort or persistence in that activity (Garris et al., 2002). Current approaches concern two dominant clusters that play a role in determining player's motivation: extrinsic and intrinsic motivation (Deci, Koestner, & Ryan, 1999; Ryan & Deci, 2000a). Gamification combines these two motivations; on one hand using extrinsic rewards such as levels, points, badges to improve engagement while striving to raise feelings of achieving mastery, autonomy, sense of belonging (Muntean, 2011).

Notably, the social aspect is important in games (Ling et al., 2005). Competition, social interaction, or cooperation may influence player behavior (Malone, 1981; Sweetser & Wyeth, 2005; Yee, 2006a, 2006b). Hence, following Vassileva (2012), the present approach covers a spectrum of motivations from extrinsic, through social, to intrinsic (Fig. 2.2). At one extreme of the spectrum, we place extrinsic motivation which is the focus of Expectancy Value Theory and Skinner's Reinforcement Theory. These theories explain the motivation to perform actions or behaviors that induce extrinsic rewards (Vassileva, 2012). On the other end of the spectrum, intrinsic motivations are the focus of Maslow's Hierarchy of Needs, Atkinson's Need Achievement Theory, as well as Bandura's Self-Efficacy Theory and Goal Setting Theory. All these are need-based theories. Theories in the middle of the spectrum explain the social motivation of games. In this context we identify Festinger's Social Comparison and Personal Investment Theory (PIT). Specific references for each theory are given in the following sections.

Additionally, we consider Deci and Ryan's (2008) Self-Determination Theory as a comprehensive theory since it encompasses both intrinsic and extrinsic motivations on a continuum from internal to external motivation (Ryan & Deci, 2000b).

The following brief overview provides the highlights of each theory together with its specific application in games. A complete review of these theories is outside the scope of this chapter. Further recommended reading can be found elsewhere
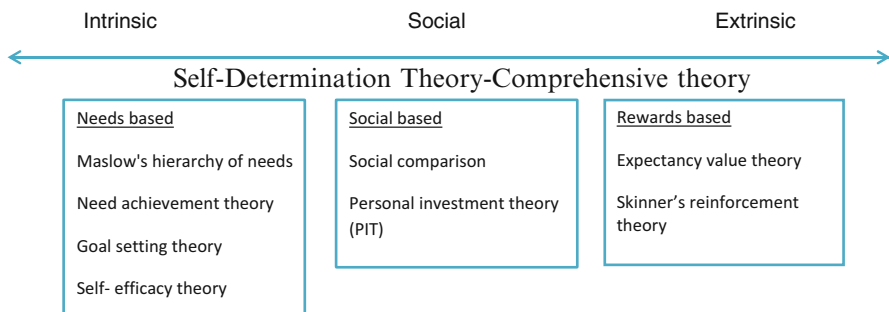


**Fig. 2.2** Model of motivation in games (based on Ryan & Deci, 2000b and Vassileva, 2012)

(Bostan, 2009; Deci, 1972; Deci et al., 1999; Deci, Koestner, & Ryan, 2001; Garris et al., 2002; Malone, 1981; Raban & Harper, 2008; Rieber, 1996; Ryan & Deci, 2000a, 2000b; Vassileva, 2012).

## 2.4   Needs-Based Theories

Needs based theories relevant for studying intrinsic motivations in serious games include Maslow's hierarchy of needs, Need Achievement Theory, Goal Setting and Self Efficacy which are briefly described in the following.

### 2.4.1   Hierarchies of Needs

One of the earliest and best known theories of motivation comes from the psychologist Abraham Maslow. According to Maslow, human behaviors are driven by the desire to satisfy physical and psychological needs. Maslow proposes five levels of needs that drive human activities, ranging from physiological needs to the need for self-actualization (Lillienfeld, Lynn, Namy, & Woolf, 2009). According to the hierarchy of needs we must satisfy physiological needs and needs for safety and security before progressing to more complex needs such as desire for belongingness, self-esteem and finally self-actualization (Fig. 2.3a). As we progress up Maslow's hierarchy we move away from needs that are produced by deficiencies to needs produced by positive goals and incentives (Lillienfeld et al., 2009; Maslow, 1943).

Based on Maslow's hierarchy of needs, Siang et al. (2003) illustrate game players' needs where the lower levels need to be fulfilled before any of the higher levels in the pyramid (Fig. 2.3b).

At the bottom level, players seek information to understand the basic rules of game. Once the rules need is satisfied, players need safety, information for persisting and winning. The third level refers to belongingness need in which players need to feel comfortable with the game and eventually achieve the game goal. After knowing that winning is possible, there is a need to feel good when playing the game—a feeling of esteem. At the next level, players start to expect a greater challenge, they need to understand and know more about the game such as different strategies. The sixth level is an aesthetic need which reflects the call for good graphics, visual effects, appropriate music, sound effects, etc. Finally, players want to be able to do anything within the game rules and constraints (attaining a form of perfection in the virtual world) (Greitzer, Kuchar, & Huston, 2007; Siang & Rao, 2003).

### 2.4.2   Need Achievement Theory

Achievement behavior is directed at developing or demonstrating, to self or to others, high rather than low ability (Atkinson & Litwin, 1960; Nicholls, 1984). It implies that in achievement situations people desire success to the extent that it

Fig. 2.3 (a) Maslow's hierarchy of needs, (b) Hierarchy of players' needs licensed from (Siang & Rao, 2003)
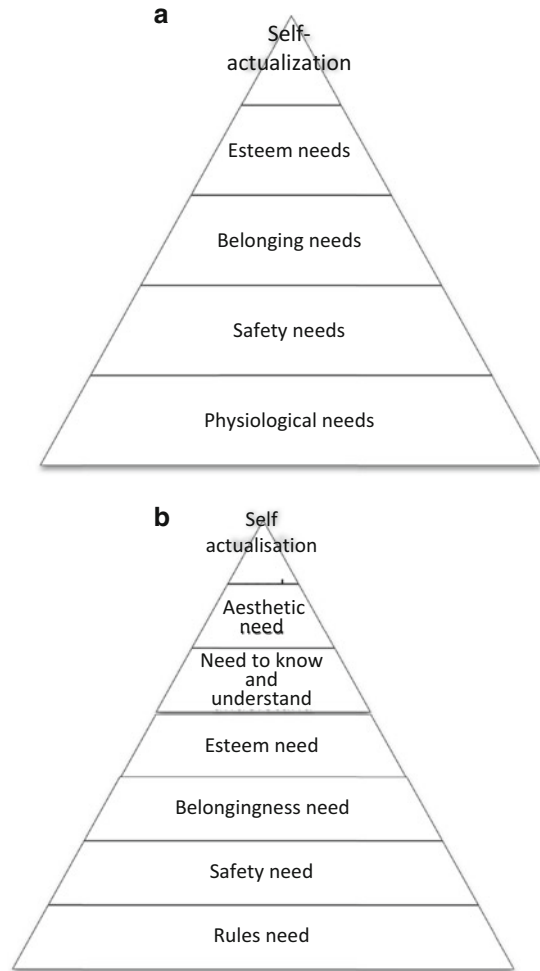


indicates high ability and seek to avoid failure which may be a signal of low ability (Nicholls, 1984). According to Atkinson, to achieve success and to avoid failure are two separate motives. These two motives affect the level of task difficulty people choose to undertake. People with high motivation to succeed prefer tasks of intermediate difficulty (Atkinson & Litwin, 1960). However, if the motive to avoid failure is stronger people prefer either very simple or very difficult tasks (Atkinson & Litwin, 1960).

Games often display achievement systems and status indicators. These systems aim to encourage game play and to monitor performance (Medler, 2011). According to Montola, Nummenmaa, Lucero, Boberg, and Korhonen (2009), achievements systems are reward structures providing additional goals for players and hence they trigger some friendly competition and comparison among users. These optional sub-goals can be easy, difficult, surprising, funny, and accomplished alone or as a group. Different achievement categories aim for different benefits. While tutorial

achievements seek to motivate players to learn the game, special play style achievements can extend the playtime by providing new ways to experience the game, and virtuosity achievements serve as a communal status symbol (Montola et al., 2009). Many games allow adjustments of task difficulty to be achievable in order to regulate the probability of success and failure according to the player's skill (Vorderer, Hartmann, & Klimmt, 2003). Research suggests that offering a moderate challenge improves the level of mastery (Nicholls, 1984). Indeed, in most social and casual games players' levels are always going up, and enable relatively quick and visible progression (Hou, 2011).

The need achievement theory is the basis for the goal setting theory which claims that specific challenging goals lead to achieve more (Ling et al., 2005; Locke, Shaw, Saari, & Latham, 1981).

### 2.4.3  Goal Setting Theory

A goal is what the individual is trying to accomplish, the object or aim of an action (Locke et al., 1981). Goal setting theory claims that difficult, specific, context-appropriate, and immediate goals, rather than long-term goals, motivate to achieve more (Ling et al., 2005). Goals affect performance by directing attention, assembling effort, increasing persistence and belief in ability to complete a task (Locke et al., 1981). Goal setting is most likely to improve task performance when the goals are specific and sufficiently challenging, the subjects have sufficient ability, feedback is provided to show progress in relation to the goal, rewards are given for goal attainment, and the assigned goals are actually accepted by the individual (Locke et al., 1981).

Pairing between goals and ability to achieve those goals is aligned with the conditions for prompting flow state (Pavlas, 2010). The connection between flow, games, and intrinsic motivation is well known (Sweetser & Wyeth, 2005). The main determinant in creating a flow experience is finding a balance between perceived skills of the player and the challenge that goes together with game play (Chen, 2007; Sweetser & Wyeth, 2005). Task requirements that gradually increase in difficulty while appropriately challenging and scaffolding are a game feature that functions as motivational construct for engagement and self-efficacy (McNamara, Jackson, & Graesser, 2009). Self-efficacy which is the confidence in ability to complete a task will be expanded in the next section.

### 2.4.4  Self-Efficacy

Self-efficacy refers to perceived performance ability for a specific activity (Bandura, 1977). Judgment of self-efficacy determines choice of activities, select challenging settings, effort expended, persistence and task performance (Bandura, 1977, 1982; Schwarzer, Bäßler, Kwiatek, Schröder, & Zhang, 1997). Self-efficacy levels can enhance or impede motivation. People with high self-efficacy choose to perform more challenging tasks. They invest more effort; they persist; and when failure

occurs they recover more quickly and maintain the commitment to their goals (Schwarzer et al., 1997).

Video game self-efficacy is the confidence in the ability to successfully play a video game (Pavlas, 2010). The construct of self-efficacy is often targeted towards specific tasks or contexts (Pavlas, 2010). Pavlas et al. (2010, 2012) argue that video game self-efficacy relates to the ability to achieve flow state.

Games often present many of the incentives described by Bandura. By making it possible to add and change elements quickly, explore different environments and influence and change the environment or the character, games encourage people to play and play them again (Bleumers et al., 2012).

Kraiger et al. (1993) assert that self-efficacy can be positively stimulated by dividing tasks of higher difficulty into smaller, less difficult tasks. They state that the more people believe they are able to bring a certain task to a successful ending the better they will perform at this task (Kraiger, Ford, & Salas, 1993). This is also implemented in games as complex tasks usually are broken down into small units, so larger accomplishments are recognized as smaller ones accumulate (Reeves & Read, 2009).

Judgments of self-efficacy are based on four types of experience. These include performance attainment, secondhand experience of observing the performance of others, verbal persuasion and social influences (Bandura, 1982). Performance experiences are the most influential; as successes heighten perceived self-efficacy and repeated failure lowers it (Bandura, 1982). Games provide immediate feedback on in-game actions and a general view on the progress one has made in a game and the position of the player towards their goal in the game (Bleumers et al., 2012). Games rank players according to their performance. Seeing similar others' behaviors and the consequential effects may also develop self-efficacy (Bandura, 1982; Peng, 2008; Schwarzer et al., 1997; Zimmerman, 2000). This enhances the social aspect of games.

The social aspect is important in games (Ling et al., 2005). Gaming applications integrated into social networking platforms such as Facebook and MySpace have enjoyed enormous popularity (Hou, 2011). These games serve as a unique setting for socialization in a playful manner, through encouraging social activates like trading, chatting, flirting, cooperation, competition and interaction with friends (Hou, 2011; Jackson, Boonthum, & McNamara, 2009). Games form communities with shared interests in and around gaming environments. In some cases this process is reinforced by offering in-game social interaction and discussion forums (Bleumers et al., 2012). The next section concerns social motivators.

## 2.5   Social-Based Theories

Social Comparison Theory and Personal Investment Theory elaborate the social side of games. Social comparison states that people seek to evaluate their beliefs, attitudes and abilities by comparing their reaction with others. Personal investment theory suggest that the level to which a person will invest personal resources of effort and time for an activity depends on personal incentives, beliefs regarding oneself, and comprehended alternatives.

### 2.5.1  The Social Comparison Theory

An important source of knowledge about oneself is comparisons with other people. This insight is the basis of The Social Comparison Theory presented by Festinger (Festinger, 1954; Wood, 1989). According to the theory we evaluate our beliefs, abilities, and reactions by comparing them with those of others (Gilbert, Giesler, & Morris, 1995; Lillienfeld et al., 2009). Festinger's "similarity hypothesis" predicts that people compare themselves with similar others (Festinger, 1954; Gilbert et al., 1995). The "unidirectional drive upward" asserts people wish to continually improve their abilities. Altogether people strive toward a better position than that of others they compare to (Wood, 1989).

Kruglanski (Kruglanski & Mayseless, 1990) claims that competitive persons have greater interest in social comparisons than less competitive individuals. The type of comparison to others is highly dependent on the context. Occasionally, it may come from a similar other, and at other times, from a dissimilar other. At some times, it is yielded by a downward comparison and, at other times, by an upward comparison (Kruglanski & Mayseless, 1990). Downward-comparison means comparing with others who are worse off than with others who are better off (Suls, Martin, & Wheeler, 2002). Wood (1989) proposes that there is a self-improvement motive, which directs comparisons. Exposure to upward targets increases self-evaluations of competence and motivation since it raises the belief in the possibility of changing status (Suls et al., 2002).

Games display feedback in the context of others' performance. Players earn points and are ordered based on the total number of points they have accumulated. The ranking may be in regard to the number of points earned relative to the highest scorer, or may be compared to other players within a certain area or age range (McNamara, Jackson, & Graesser, 2010). Comparing players along quantitative measurements provokes competition (Medler & Magerko, 2011). Competition can be introduced as the challenge to master given tasks. Limitations of the playing situation may also arise from a social situation in which the user competes against an opponent (Vorderer et al., 2003). Game play is monitored by ongoing evaluations. These evaluations include the perception about how the current position is in contrast to the positions of the others and what tendency is expected for the further process of the competition (Vorderer et al., 2003). Thus, the evaluations consist of different social comparisons related to the current situation (Gilbert et al., 1995; Vorderer et al., 2003). In accordance with the ongoing evaluations and social comparisons the player's self-esteem changes (Vorderer et al., 2003).

### 2.5.2  Personal Investment Theory (PIT)

Personal Investment Theory (PIT) integrates social influences with the examination of achievement motivation (Schilling & Hayashi, 2001). PIT holds that the meaning a person creates in the form of beliefs, perceptions, feelings, purposes, and goals motivates behavior. These cognitive elements are the key to understand and predict

investment behavior such as participation, spending of time and effort (Granzin & Mason, 1999; Schilling & Hayashi, 2001).

The conceptual framework features three major segments: meaning, antecedents to meaning, and personal investment behavior (Granzin & Mason, 1999).

Specifically, the theory defines three basic components of meaning as critical to determining personal investment in specific situations: personal incentives, sense of self, and perceived options (Granzin & Mason, 1999; Schilling & Hayashi, 2001). Personal incentives may be intrinsic or extrinsic. Among these motivators are task incentives that reflect skill improvement and mastery; ego incentives that reflect a wish to perform better in comparison with others; social incentives as affiliation and solidarity with others, and extrinsic rewards in the form of monetary compensation or social recognition and approval from significant other persons (Granzin & Mason, 1999; Schilling & Hayashi, 2001). The sense of self refers to the perceptions, beliefs and feeling related to competence, goal-directedness, self-reliance and social identity (Granzin & Mason, 1999; Schilling & Hayashi, 2001). Finally, perceived options are alternative activities that participants identify as available and appropriate. These perceived options are often influenced by social aspects such as affiliation, opportunities to help and/or socialize with others, and family relationships (Granzin & Mason, 1999; Schilling & Hayashi, 2001).

Games use incentives as motivational hooks that maintain interest and help to stretch engagement and repeat usage. Generally, incentives are reliant on some aspect of performance (McNamara et al., 2009). These incentives can come in the form of points, badges leveling and user reputations (McNamara et al., 2009). This large variety of feedback mechanisms aids in monitoring game decisions and performance according to oneself and to others (McNamara et al., 2009).

## 2.6 Rewards-Based Theories

On the right side of the spectrum (Fig. 2.2) extrinsic motivations are created through external factors, rewards, or incentives (Pavlas, 2010). We refer to two main theories in this regard: Expectancy Value Theory and Skinner Reinforcement Theory.

### 2.6.1 Expectancy Value Theory (EVT)

Expectancy value theory relates to the strength of motivation to strive for a certain goal, to the expectations to attain the desired goal, and to the incentive value of that particular goal (Vansteenkiste, Lens, De Witte, & Feather, 2005). Expectancy value theory holds that goal-directed behavior is a function of the belief that efforts will lead to performance needed to attain the rewards; performance will determine the outcome; and the value attached to achieving the outcome (Shepperd, 2001).

The theory argues that expectancies and values influence achievement choices, persistence, effort, and performance (Eccles & Wigfield, 2002; Wigfield, 1994; Wigfield & Eccles, 2000). In turn they are influenced by task-specific beliefs such as ability, perceived difficulty, and individuals' goals, previous experiences and a variety of socialization influences (Eccles & Wigfield, 2002; Wigfield, 1994; Wigfield & Eccles, 2000).

Ability and expectancy beliefs are present in other theories as well. Bandura (1977) included expectancies in his discussion of self-efficacy and distinguished between efficacy expectations (the belief that one can successfully accomplish a task), and outcome expectancies (belief that a given action will lead to a given outcome) (Wigfield, 1994).

Theory recognizes internal versus external control which refers to whether the reinforcement or an outcome is a function of effort or personal characteristics versus chance, luck, or is simply unpredictable (Rotter, 1990). The effects of reinforcement on preceding behavior depend in part on whether the person perceives the reward as contingent on behavior or independent of it (Rotter, 1966). Internal locus of control was found to help progress through tasks more quickly and accurately.

Games provide a sense of control by including features that encourage user personalization and control (McNamara et al., 2009). Allowing users to control certain aspects provides opportunities to become invested in game environment and create identification with some aspect within it. McNamara et al. (2010) suggest two types of control. Affording control over aspects of the environment; for example, changing the color schemes, the background, or the avatar, or choosing a task, such as a mini-game. The second type is setting of personal goals or sub goals. For example, set the goal of obtaining a certain number of points or reaching the top level in the system (McNamara et al., 2009, 2010). Von Ahn and Dabbish (2008) state that using points increases motivation by providing a clear connection between effort in the game, performance and outcomes.

Skinner's Reinforcement Theory which we outline next explains the motivation to perform actions or behaviors that lead to extrinsic rewards. Skinner claims that behavior is the product of reinforcements. Behavior differs depending on the schedule of reinforcement, that is, the pattern of delivering it (Lillienfeld et al., 2009). For Skinner persistence is a consequence of being on a reinforcement schedule that is difficult to extinguish.

## 2.6.2   Skinner's Principle of Partial Reinforcement

Reinforcement as understood by Skinner constitutes outcomes that strengthen the probability of a response (Lillienfeld et al., 2009; Skinner, 1957). Skinner noted that continuous reinforcement establishes desired behaviors quicker than partial reinforcement. But once the continuous reinforcement is removed, the desired behaviors extinguish quickly. According to his principle of partial reinforcement

occasional reinforcement of behaviors leads to a greater persistence to extinction than continuous reinforcement (Lillienfeld et al., 2009).

Behavioral studies suggest that different schedules of reinforcement yield distinctive patterns of responding (Lillienfeld et al., 2009; Skinner, 1957): ratio schedules tend to yield higher rates of responding than interval schedules; variable schedules tend to yield more consistent rates than fixed schedules (Lillienfeld et al., 2009). Variable ratio schedules are more effective than fixed ratio in sustaining desired behaviors (Jablonsky & DeVries, 1972). Gambling and lottery games are good examples of a reward based on a variable ratio schedule.

Malone applied the same idea stating that in order to engage a learner, feedback should be surprising, and he proposed to do this by using randomness (Malone, 1981). Hacker and Von Ahn (2009) studied several variations of score keeping functions, and showed that different functions yielded different game behaviors (Hacker & Von Ahn, 2009). This awaits further research.

To conclude this overview of existing approaches and theories related to motivating participation in gamification systems we refer to self-determination theory which encompasses both intrinsic and extrinsic motivation. Many researchers consider intrinsic and extrinsic motivations as two distinguishable and separable motivations. In contrast, Self-Determination Theory (SDT) defines intrinsic and varied extrinsic sources of motivation on a continuum from internal to external motivation (Ryan & Deci, 2000b). The next segment elaborates on this.

## 2.7   Self-Determination Theory

Self-Determination Theory (SDT) focuses on types, rather than amount, of motivation, paying particular attention to autonomous motivation, controlled motivation, and amotivation as predictors of performance and well-being (Fig. 2.4). SDT proposes that motivation is multidimensional and resides along a continuum of self-determination ranging from intrinsic motivation through extrinsic motivation to amotivation (Gillison, Standage, & Skevington, 2006; Ryan & Deci, 2000b).

SDT discusses three psychological needs: autonomy, competence, and relatedness (Rigby & Przybylski, 2009; Ryan & Deci, 2000b; Wang, Khoo, Liu, & Divaharan, 2008). Autonomy is the ownership of one's behavior. Competence is the
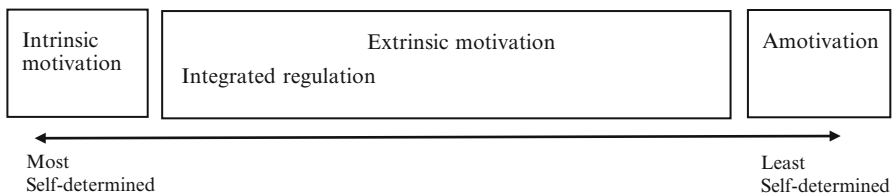


**Fig. 2.4**   The concept of a continuum from internal to external motivation (based on Ryan & Deci, 2000b )

ability to produce desired outcomes and to experience mastery and effectiveness. Relatedness is the feeling of being connected with others. If these three needs are satisfied, growth and development results, and intrinsic motivation for the task increases. When the three needs are not met, negative emotions (anxiety and anger) may result, and intrinsic motivation is undermined (Wang et al., 2008).

According to the SDT theory there are six classifications of distinct types of motivation: intrinsic motivation, amotivation and four extrinsically motivated behaviors which are external regulation, introjected regulation, identified regulation and integrated regulation (Ryan & Deci, 2000b). Integrated regulation and intrinsic motivation are both forms of autonomous self-regulation. Accordingly, qualities that are associated with intrinsically motivated behavior can be used as markers of the extent that an extrinsic regulation has become integrated (Deci, Vallerand, Pelletier, & Ryan, 1991). Studies show that more autonomous extrinsic motivation is associated with more engagement, better performance, lower dropout, and higher quality learning (Ryan & Deci, 2000b).

Studies of SDT and education have shown that supporting intrinsic needs of autonomy, competence, and relatedness facilitates deeper and more internalized learning (Rigby & Przybylski, 2009), and that from the self-determination perspective, the fundamental principles that support enjoyable games and learning are well synchronized (Rigby & Przybylski, 2009). Recent studies confirmed that experiences of competence, autonomy, and relatedness were major contributors to game enjoyment, regardless of the specific content, complexity, or genre of games (Przybylski, Rigby, & Ryan, 2010; Wang et al., 2008).

Research demonstrates a close link between autonomy satisfaction, intrinsic motivation, and the experience of play (Bleumers et al., 2012; Deterding, 2011; Pavlas, 2010). The choice to volunteer to play provides a strong experience of autonomy, which is intrinsically motivating; this is further supported by the lack of external consequences. Games foster feeling of competence (i.e., self-efficacy) through feedback and rewards, and support feeling of relatedness through social connection, competition and cooperation (Bleumers et al., 2012; Ryan, Rigby, & Przybylski, 2006).

In the next section we further our discussion on gamification by linking the theoretical background to reward mechanisms. This will deepen our understanding on how rewards become compelling and how they satisfy players' desires.

## 2.8  The Theoretical Base of Game Incentives and Rewards

The integration of game elements in non-game systems to incentivize repeat usage, increase contributions, and establish user reputations, can come in many different forms such as points, badges and levels. Common implementations include: ownership (such as points, tokens and badges); achievements (a representation of accomplishment); status (computing and displaying a rank or level); collaboration (challenges that can be resolved by working together) (Vassileva, 2012).

People consider different things as rewarding, depending on their intrinsic needs, values and goals. This invites research on mechanisms imbedded in games in light of the comprehensive model we introduce in the previous section. For example, Social Comparison Theory can explain the motivational effect of the leaderboard since it states that people tend to compare themselves with others, who they perceive as similar to them, in order to evaluate or enhance some aspects of the self (Vassileva, 2012). Social Comparison Theory explains the motivational aspect of status and reputation assessments, in line with needs-based theories. These theories point to the human need to socialize and seek social recognition and status (Fu, 2011). Social status and reputation can be also explained by Bandura's Self-Efficacy theory since they are usually a result of recognized mastery (Vassileva, 2012).

One way to gain reputation is by collecting badges. Badges advertise one's achievements and past accomplishments (Antin & Churchill, 2011). In addition, badges also function as a goal-setting device; they signal progression by being rewarded for the completion of distinct goals; they represent achievements and success; and they leverage the drive of collecting (Gnauk, Dannecker, & Hahmann, 2012). Badges provide a kind of social shaping as they represent social norms through illustrating types of activities and interactions that are valued (Antin & Churchill, 2011; Halavais, 2012). Therefore, we can sketch the motivational aspect of badges with the help of social motivations as well as needs based theories. Badges also serve as reminders of past achievements; they mark significant milestones and provide evidence of past successes. These characteristics build self-competence and self-efficacy. The interplay between status and affirmation highlights how badges can be engaging from either an individual or a group point of view (Antin & Churchill, 2011). Some users are likely to attend more to the individual benefits of badges while others are more likely to attend to the social aspect.

Games present social incentives such as gifting (Vaijayanthi & Marur, 2012). Gift giving can be a strong motivator, where it functions as an altruistic expression (Fu, 2011). Virtual items and gifting foster relationships and personal investment and thus stimulate motivation according to social and personal investment theory (Fu, 2011). Virtual items are oriented towards self-expression while social exchanges collecting scarce resources point to needs theories (Fu, 2011). Levels fuse these two kinds of motivation. Levels reflect status since it indicates proficiency in the overall gaming experience over time. But they also function as a goal setting tool; they mark progression of difficulty thus increase self-efficacy (Fu, 2011; Gnauk et al., 2012; Jackson et al., 2009).

Each theory or a combination thereof, needs achievement, expectancy, goal setting and social comparison, may explain the motivational effect of achievements. Players enjoy exploring their data while being encouraged to collect new achievements and compete with other players (Medler, 2011; Medler, John, & Lane, 2011; Medler & Magerko, 2011). Different achievement categories aim for different benefits. Achievements promote social status; some players become collectors playing thoroughly in order to maximize achievements; they trigger competition and comparison among users due to the rarity of some achievements. In addition, achievements allow to measure progression and establish sub-goals (Medler & Magerko, 2011; Montola et al., 2009). Specific games such as World of Warcraft have an

internal achievements system that enables unique identifiers which allows players to build reputations and enhance self-efficacy (Medler, 2009).

We end this discussion with one of the most commonly used patterns of feedback in games, accumulation of points. Feedback mechanisms stimulate self-regulation and self-efficacy by providing direct input on performance, and thus afford regulating and monitoring performance more accurately (McNamara et al., 2009). Points are a flexible form of feedback. Points are used as a scoring system, a progression indicator, a scale of rank, a goal setting tool or even as a currency (Fu, 2011; Garris et al., 2002; McNamara et al., 2009; Vassileva, 2012; von Ahn, 2009). Points encourage mastery of the game (Federoff, 2002). They trigger competition which eventually results in a change of players' status (Fu, 2011; Leemkuil, Jong, & Ootes, 2000; Liu, Alexandrova, & Nakajima, 2011). Point systems measure progression and performance which provoke self-efficacy (Gnauk et al., 2012). The social effect of points ranges from status earned by performing certain actions up to reputation that is based on ratings received by others (Gnauk et al., 2012; Vassileva, 2012). A secondary contribution emerges by engagement of lurkers through ratings and comments (Farzan et al., 2008; Vukovic, Laredo, & Rajagopal, 2010). Therefore, the motivational aspect of points is outlined with the help of social motivations as well as needs based theories and rewards based theory. Table 2.1 summarizes the above discussion while tying rewards and incentives used in games into the motivation model that was offered in the previous section.

**Table 2.1** Theoretical base of incentives and rewards

| Motivation theory | Incentives/rewards | Role |
| --- | --- | --- |
| Self efficacy | Audio/verbal/visual/music/sounds effect | Feedback |
| | Progress bar | Feedback, achievements |
| Self-efficacy, goal-setting, PIT, expectancy value, need achievement | Points/bonus/divident | Feedback, reward, status, achievements, competition, progression, ownership |
| | Mini games/challenges/quests | Reward, status, competition, achievements |
| Self-efficacy, goal-setting, PIT, expectancy value, social comparison | Badges | Status and reputation, achievements and past accomplishments, collection, competition, ownership |
| | Virtual goods | Reward, social, status, achievements, ownership, self-expression |
| | Leaderboard | Status and reputation, achievements, competition |
| | Rewards-choosing colors, power | Achievements |
| Self-efficacy, goal-setting, PIT, expectancy value, need achievement, social comparison | Achievements | Collection, status, competition, discovering, progression |
| | Levels | Feedback, status and reputation, achievements, competition, moderate challenge |
| Social comparison, personal investment theory, expectancy value | Avatar | Social, self-expression, ownership |

The right column denotes the way in which the specific incentive is related to motivation. Incentive and rewards mechanisms are rarely grounded on a single theory; usually they rely on motivations along several theories in combination.

In the next section we refer to rewards attributes and present our conceptual analysis.

## 2.9   Mapping Game Elements

To conclude, we map the most commonly used rewards (such as points, badges, ranks, virtual goods etc.) according to various characteristics, such as: tangibility, exchangeability, immediacy, effect on progression. For instance, looking at points and badges reveals that badges operate on a different level from points. Whereas points create direct competition, badges afford mostly indirect relationships. Badges are more personal and usually not exchangeable, while points operate as means of exchange, a virtual currency that can be exchanged for something of value, tangible or virtual (Fu, 2011; McNamara et al., 2009). Users may spend points in order to purchase virtual items that reflect their personal identity in a community (Fu, 2011). Virtual items, in turn, have both value in use (using a virtual sword to win a game) and value in exchange (Fu, 2011). Virtual items, badges and achievements create loyalty and raise exit barriers as they are generally limited to the system on which they are issued (Liu et al., 2011)

Achievement systems can provide players with rewards that are usable in the game in contrast to having rewards that are related to accumulating achievements and unlocking badges (Hamari & Eranti, 2011; Hamari & Lehdonvirta, 2010). This implies that some achievements are optional in the sense they do not affect the progress of the player in the core game (Hamari & Eranti, 2011; Hamari & Lehdonvirta, 2010; Montola et al., 2009). Future work may elaborate further the relationship between achievements and core game as well as other classifications that were introduced above.

## 2.10   Conclusions and Future Work

Gamification aims to create a sense of playfulness in non-game environments so that participation becomes enjoyable and desirable (Thom, Millen, & DiMicco, 2012). This idea is worth further examination in light of the increased use of gamification systems in the workplace (Farzan et al., 2008), learning processes and educational environments (Jackson et al., 2009; McNamara et al., 2010; Muntean, 2011; Raban & Geifman, 2009; Rafaeli et al., 2003; Ravid & Rafaeli, 2000). Table 2.2, which appears in the Appendix, lists some gamification systems in business and education. While Table 2.2 supplies a wealth of successful implementations of gamification, developers should carefully consider the human aspect

explicated in this chapter to avoid unexpected results such as the cases of Google News badges as well as prevent user fatigue. The gamification elements in Table 2.2 provide examples of the commercial implementation of some of the theories outlined here. For example, the use of badges corresponds to several theories including self-efficacy, goal-setting, PIT, expectancy value, social comparison—these were listed in Table 2.1. So by integrating both tables a rich matrix of theories and their applications emerges.

Game elements and rewards serve as a starting point to understand gamification effectiveness. We suggest understanding them within a broader context. The model of player motivations provides the basis to understand and consider how players differ from one another and how motivations of play relate to rewards patterns and in-game behaviors. By this we strengthen the link between gamification and other established disciplines. Maslow's hierarchy of needs provides an anchor to the study of player's motivation, while the proposed model offers higher level needs and broadens and deepens them. Thus, for example, as illustrated in Table 2.1, leaderboards, badges and levels support the need for status, recognition, prestige and also strengthen competence and mastery. Understanding human drivers, beliefs, and emotions is important to the design of reward systems in order to achieve desired outcomes. Our proposed framework classifies achievements according to their attributes.

More and more applications use game design elements to motivate user behavior in non-game contexts, yet there is to date little empirical research on how gamification works and whether it succeeds in promoting user motivation (Deterding, 2011). Additionally, success in one non-game context does not guarantee that the same mechanism will be successful in another non game context. Research is needed to describe the essential game mechanics in different contexts such as in the enterprise or in educational and learning environments. There is much to be asked about the relationship between game behavior and distinct game design elements. Existing motivational models for video game play focus on how a game as a whole creates experiences of fun (Deterding, 2011; Sweetser & Wyeth, 2005). They are not linked to the more granular level of single game pattern. A closer examination may provide more insights regarding desired type of behavior and participation.

The broad spectrum of theories we cite can serve as a basis for research opportunities investigating how a more inclusive model of motivation theories can be applied to guide the design of incentive mechanisms. A conceptual consolidation of theories may aid to carefully craft reward and incentive mechanism to increase short-term and long term performance and promote game persistence. Eventually, by introducing different game elements and combining different types of motivators new challenges arise. For example, combining a leaderboard with points adds a social dimension with an unknown effect on motivation: it may either promote intrinsic motivation by experiencing competence, or reduce intrinsic motivation, if perceived as controlling. Another aspect we need to take a closer look at is how these rewards affect the design of different kinds of games; serious games versus casual games versus social games or educational games etc.

Understanding game rewards and motivation offers interesting implications in various fields such as business, game design, collaborative design environments and education.

While the goal is to create and maintain intrinsic motivation, gamification is the application of extrinsic motivators. Careful selection and implementation of these motivators will trigger internal motivation and aid in maintaining it. For example, a combination of a progress bar and a leaderboard is likely to generate excitement, commitment, a will to finish a gamified activity in a successful manner, and even to repeat the experience.

# Appendix

**Table 2.2**  Examples of some gamification systems in business and education

| Platform | Description | Gamification elements | Uniqueness | Website |
|---|---|---|---|---|
| FourSquare | Location-based application | Badges, levels, points, progression, social, leaderboards. "Major" of a place | Virtual rewards such as the "mayors" of Starbucks or certain badges could be converted into real products (free coffee) | https://foursquare.com/ |
| Nike+ | A social running game-like service | Challenges, daily goals, support from friends, compare results over time, rewards, visual progress rich graphs and charts, unlock awards, trophies and surprises | Nike + devices measure every move and turn them into NikeFuel | http://nikeplus.nike.com/plus/ |
| Club Psych | TV series | Points, mini games, prizes for completing the weekly challenge. Rewards, avatars, leaderboard, badges. | | http://clubpsych.usanetwork.com/ |

**Table 2.2** (continued)

| Platform | Description | Gamification elements | Uniqueness | Website |
|---|---|---|---|---|
| Stack Overflow | A question and answer site for programmers | Badges (gold, silver and bronze) for participation, profile page of a user, levels, reputation points, helping others. As you earn reputation, you'll unlock new privileges like the ability to vote, comment, and edit other people's posts. Highest levels get access to special moderation tools | Reputation score—when others vote up your questions, answers and edits | http://stackoverflow.com/ |
| Peekaboom | Improves on the data collected by the ESP Game. Locate objects in images | Points, leaderboards. Bonus points, bonus round is time limit, levels, time, hints, partial feedback (hot/cold), visual ping | Displays the cumulative top scores of the day as well as the top scores of all time. Ranking players based on the total number of points they have accumulated throughout time. Single/two-player game | (www.peekaboom.org) |
| The ESP Game | Human computation. Image tagging | Points, levels, feedback, time limit, progress bar | Taboo words. Two-player game | www.espgame.org |
| Floracaching | A search-and-discover game inspired by the idea of geocaching | Points, levels, badges, progression | Spend points to make a floracache | http://www.gamesfornature.org/games-review/floracaching/ |
| Collabio | Social tagging game within an online social network | Points, leaderboard, hints, My Tags page | Individual leaderboards and global leaderboards | |
| Google PowerMeter | Energy monitoring tool | Visualizations of energy usage, share information with others, personalized recommendations, compare over time | | http://www.google.com/powermeter/about/ |

**Table 2.2** (continued)

| Platform | Description | Gamification elements | Uniqueness | Website |
|---|---|---|---|---|
| FoldIT | Protein structure prediction | Categories, scores, leaderboard, contests, goals | Soloist/groups | http://fold.it/portal/ |
| Khan Academy | A free world-class education | Visual feedback-information about everything and whether or not you've been reaching the goals. Challenges, badges and points. Special awards for completing topic challenges, global classrooms | Legendary badges might require years of work | http://www.khanacademy.org/ |
| CAPTCHAs | Colorful images with distorted text in them at the bottom of registration forms | Guess 3 out of 7 distorted image. Solve a visual pattern recognition problem. After seeing two series of blocks, the user is presented with a single block and is asked to determine the side to which the block belongs. Choose a word that relates to all the images | Use by most popular web sites to prevent automated registrations similar to the Turing Test—distinguish humans from computers, but differ in that the judge is now a computer | |
| Coursera | Learning-courses from the top universities, for free to everyone | Badges, community, voting (points, forum), sharing, ranking (color point), status (TA), Coursera Store (Coursera's Financial Aid program for Signature Track), token of appreciation, special E4E sticker, meetup | | http://blog.coursera.org/post/52856244062/the-coursera-store-supporting-education-for-everyone |
| Duolingo | Learning languages | Levels, vote, time, weekly progress, progress bar, skill tree, skill points, rank, counting, daily progress, badges, reminders/triggers, tips, sharing, leaderboard | webpage translation | http://www.duolingo.com/info |

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