Gamification From the Perspective of Self-Determination Theory and Flow

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Abstract

In human-computer interaction, the trend towards gamification is part of the shift of focus from usability to the more holistic approach of user experience. Gamification is "the use of game elements in non-game contexts" and is increasingly used in a variety of domains such as crowd sourcing, health care, sustainability, sports and learning. In today's Internet, consumer loyalty is low and high expectations are placed upon positive effects of gamification. Despite its widespread use, only a small number of studies have examined the phenomenon empirically and it is still unclear if and how gamification is able to live up to expectations. A promising approach is to study gamification from the perspective of motivation theories. The extensive research on rewards and research in the field of video games makes the theory of self-determination a viable starting point. Likewise, the concept of flow has strengths when it comes to designing for an optimal user experience and usability. Following the approach of self-determination theory, the possible effects of personal, situational and contextual factors will be discussed and recommendations for design and possible research will be given.

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Contents

Introduction

In the field of human-computer interaction (HCI), the trend towards gamification can be viewed as a part of the shift of focus from usability to the more holistic approach of user experience (Hassenzahl & Tractinsky, 2006). In user experience the interaction with a product is regarded as more than just using a tool because other important factors like beauty, affect, and experimental uses of technology also play a part (Hassenzahl & Tractinsky, 2006). The term gamification dates back to 2008 but is commonly used only since 2010, when discussion and controversy around the term arose (Deterding, Dixon, Khaled, & Nacke, 2011). Zichermann and Cunningham (2011, p. xiv) regarded gamification as "The process of game-thinking and game mechanics to engage users and solve problems". Deterding et al. (2011, p. 2) defined the term as "the use of game design elements in non-game contexts", which is the most prevailing definition to this date. This definition indicates that gamified systems are not full-fledged games as they use only some elements of game design (e.g., points and leaderboards) and also do not belong to the classical context of games. From chess over tag to Tetris, games are activities that are intended to be *fun*, *limited in time and place*, *non-productive*, *governed by rules*, *fictitious*, and *do not have a predefined outcome* (Caillois, 1991). Even a gamified system with many game elements distinguishes itself from a game by the designers' intended purpose, which is not to create a game, but to turn a non-game activity into a game-like activity. Often, the goal of gamification is to help the user to complete a task more efficiently or to make it more enjoyable. This promises to increase engagement, influence, loyalty, fun and revenue with the help of game design elements (Deterding, 2011). It is not surprising that some analysts expect strong growth and increasing application (Gartner, 2011). But how should gamification be able to achieve this? A potential key element is *motivation*. Motivation is the force that causes people to act – to do something and to persist doing it. When interacting with a digital system, motivation plays an important role (Jung, Schneider, & Valacich, 2010). For example, the motivational affordance (i.e., the actionable properties between an object and an actor) might influence the attraction to a certain system and the duration of an interaction with this system to a great extent (Zhang, 2008). Even if a system is used involuntarily, engaging experiences that affect motivation might still occur

(O'Brien & Toms, 2008). The motivational properties of digital systems are important and research in this area might benefit from decades of research on human motivation in psychology.

There are a great number of motivation theories addressing different aspects of the phenomenon. Two motivation theories are particularly of interest in gamification research because they have already been applied to interactive systems and full-fledged games. For example, Ryan and Deci (2000a) used a cause-oriented and activity-oriented approach to determine between different *orientations* of motivation. Their concept of extrinsic and intrinsic motivation as a part of the theory of self-determination (SDT) is one of today's most influential motivation theories (Deci & Ryan, 2004). Accordingly, they define intrinsic motivation as *an activity one does because it is inherently interesting or enjoyable* and extrinsic motivation as *doing something because it leads to a separable outcome* (Ryan & Deci, 2000a). Hence, people can be intrinsically motivated to do something, which means that they are doing it just for the enjoyment while doing so. Both verbal and tangible rewards – important aspects of gamification – have been studied intensively in this research area. Self-determination theory has also been successfully applied to the context of video games (Ryan, Rigby, & Przybylski, 2006). The focus on rewards and intrinsic motivation as well as the growing body of research which includes video games makes the theory of self-determination a viable starting point to study gamification. A related approach to examine especially the positive aspects of motivation is the concept of *flow*. Csikszentmihalyi (1990) described flow as a state of mind of utter concentration on and absorption in the task at hand. Flow appears in those moments, when we forget time, our worries and become one with an activity. Csikszentmihalyi also discusses what facilitates the occurrence of flow and what keeps it alive. Numerous researchers and designers (e.g., Agarwal & Karahanna, 2000; Chen, Wigand, & Nilan, 2000; Pilke, 2004; Rettie, 2001; Webster, Trevino, & Ryan, 1994; Wong, 2006) have highlighted the importance of designing for flow experiences during the interaction with technology. The concept has also been applied to video games (e.g., Cowley, Charles, Black, & Hickey, 2008; Hsu & Lu, 2004; Johnson & Wiles, 2003), making it possible to construe some aspects for gamification from it.

The aim of this thesis is to examine gamification from the perspective of self-determination theory and flow. Both concepts will be introduced in the next two sections by providing the theoretical background to understand these and to apply them to this particular context. The fourth section will deal with three studies that provide interesting insights into the gamification phenomenon. The results of these studies will be examined from a *motivational* perspective by applying concepts of SDT and flow. In the last section, the discussion, the applicability of SDT and flow as well as the implications of the previously introduced studies will be reviewed. The question of whether and how gamification is able to meet the expectations for increased engagement, influence, loyalty, fun and revenue is still unanswered. However, self-determination theory and flow can give valuable insights into human motivation and may be an important resource in designing for effective and meaningful gamification.

Theory of Self-Determination

Self-determination theory was developed over the last 50 years by Richard M. Ryan and Edward L. Deci (2000a). It has its roots in humanistic psychology and it follows the hierarchy of human needs by Maslow (1943). The fulfillment of basic human needs described in the SDT is a resource of personal growth and psychological well-being. According to Ryan and Deci (2000a), every human being tries to gain as much autonomy over its own actions and decisions as possible. Likewise, humans strive for competence in their actions and surroundings. These two needs are essential but as activities such as learning often happen in a social context (e.g., classroom) a third factor is proposed: relatedness. Studies have shown that a context of security, warmth and autonomy support created by a parent or a teacher fosters intrinsic motivation and exploratory behavior (Anderson, Manoogian, & Reznick, 1976; Bowlby, 1976; Grolnick & Ryan, 1989). The fulfillment of the three basic needs, competence, autonomy and relatedness does not rely on objective judgment but on the personal perception. However, these needs that cannot be fulfilled completely but rather urge us – as the source of intrinsic motivation – repeatedly to act in life. In SDT, the quality of the motivation is crucial not its strength (Ryan & Deci, 2000a). In their theory Ryan and Deci

(2000a) differentiate between:

1. Amotivation: no motivation existent

2. Extrinsic motivation: regulated externally

3. Intrinsic motivation: regulated internally

It is believed that these three sections are part of a continuum and are not isolated categories. SDT further includes five sub-theories that can describe and explain the research findings in motivation (Ryan & Deci, 2000a).

Theory of Basic Psychological Needs

The aforementioned three psychological needs, autonomy, competence and relatedness, are believed to be universal however varying individually in the goals and orientation, the developmental states, and across different cultures. Competence is the perceived extent of one's own actions as the cause of desired consequences in one's environment (Ryan & Deci, 2000a). Competence can be improved with direct and positive feedback, optimal challenges and freedom of demeaning evaluations (Ryan & Deci, 2000b). The feeling of competence is said to not enhance intrinsic motivation unless the competence is perceived as caused internally (Vallerand & Reid, 1984). If the locus of causality is perceived internally the resulting behavior is regarded as autonomous. In case people experience low autonomy even feelings of competence will not increase intrinsic motivation (De Charms, 1968). This need for autonomy can be fulfilled with free choice and alternatives for action. Studies have shown that choice, acknowledgment of feelings, and opportunities for self-direction increase perceived autonomy and therefore intrinsic motivation (Ryan & Deci, 2000b). Relatedness is the urge to interact, be connected to, and experience caring for others.

Organismic Integration Theory (OIT)

The OIT by Ryan and Deci (2000a) tries to explain the mechanisms regulating motivation. Depending on the perceived locus of causality of an action (between the poles external/impersonal and internal) this theory discriminates six forms of regulation as illustrated in Figure 1. In the state of amotivation, a person is lacking the intention to act. Usually such a person would not act at all or act without intent. Not valuing an activity, not
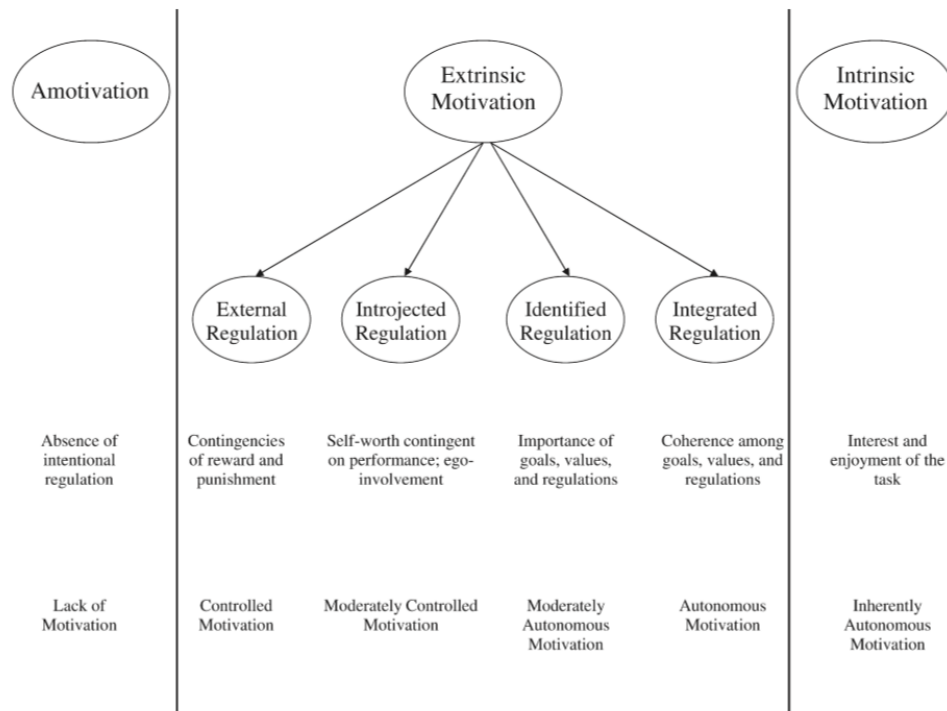
Figure 1. The continuum of self-determination. Amotivation, which lacks self-determination; the types of extrinsic motivation with a varying degree of self-determination; and intrinsic motivation. Reprinted from "Self-determination theory and work motivation", by M. Gagné and E.L. Deci, 2005, *Journal of Organizational behavior, 26(4)*, p. 336.

feeling competent to do it or not expecting it to have a desired outcome can result in amotivation. External regulation corresponds to the narrow definition of extrinsic motivation. Individuals in situations that are perceived to be regulated externally do not identify themselves with the goal of an action and thus act only because of compliance, external rewards or to avoid external punishment. These actions are the least autonomous and individuals experience these situations typically as controlled or alienated. Ryan and Deci (Ryan & Deci, 2000a) argue that this is the type of motivation focused by operant theories (e.g. Skinner, 1938). A further type of regulation is introjected regulation. People in such situations act because it maintains their self-esteem, to avoid guilt or anxiety. They can also act because of ego-involvement or enhancement (pride). The behavior is internally driven but the locus of causality is not experienced as part of the self. In contrast, identified regulation is a form of extrinsic motivation that relies on conscious valuing of a behavioral goal or

regulation. The action is seen as personally important. Extrinsic motivation through integrated regulation occurs when identified regulations are completely assimilated to the self. In that case, the regulations have been evaluated and brought into matching with one's values and needs. This form of regulation is very similar to intrinsic regulation. It is only distinguishable in the locus of control, where integrated regulation is still driven by a goal in contrast to intrinsic regulation where the behavior is driven by the enjoyment of the action itself. The six forms of regulation depicted in Figure 1 are not meant as steps of the development but different points where any point on the continuum can be a starting or a present point, depending on prior experiences and current situational factors. Still, studies have found that there is the possibility that regulatory styles become more internalized with higher age, more cognitive capacities and ego development (Chandler & Connell, 2011).

Cognitive Evaluation Theory (CET)

The CET postulates that the effects of external events on intrinsic motivation are mediated by a person's perception of how these events influence their competence and self-determination. Events that increase self-determination are more likely to increase intrinsic motivation. Additionally, events supporting competence increase intrinsic motivation if these events are perceived as self-determined. CET applies for other external events such as evaluations, deadlines, competition, externally imposed goals, the interpersonal setting and of course rewards. Rewards and their effect on intrinsic motivation have been debated heavily (Cameron & Pierce, 1994). Deci, Koestner, and Ryan (2001) argued that rewards can have an informational and a controlling aspect. For example, unexpected rewards should not undermine intrinsic motivation because the reward is most likely not perceived as controlling. Rewards can contain informational as well as controlling aspects but if the controlling aspect of a reward is more salient than the informational the reward is expected to affect intrinsic motivation negatively (Deci et al., 2001). Basically external events can satisfy the need for competence or autonomy by supporting the perception of an internal locus of control (Deci, Koestner, & Ryan, 1999). Deci et al. (2001) make a distinction between verbal and tangible rewards. Verbal rewards are regarded as giving explicit positive performance feedback and are

also mediated by the interpersonal context, e.g. using verbal rewards in a controlling or informational manner. Studies imply that informational verbal rewards increase intrinsic motivation compared to controlling verbal rewards (Deci et al., 2001). According to CET tangible rewards such as money should decrease intrinsic motivation because they are generally considered as controlling. One case where tangible rewards do not impair intrinsic motivation is when they come unexpectedly (Deci et al., 2001). Deci and Ryan categorize tangible rewards by three criteria: Task non-contingent, task contingent and performance contingent rewards. Task non-contingent rewards are given for some not task related reason such as simply for participating in the experiment. Task contingent rewards are those who are given for either engagement in a task or completion thereof. Hence, this category can be divided in engagement contingent and task contingent rewards. The third category is performance contingent rewards, which are expected to be the most frequent in the real world. In their review, Deci et al. (1999) found evidence that all types of rewards do affect intrinsic motivation negatively, except those which are task non-contingent. But according to CET performance contingent rewards can affect intrinsic motivation also positively if the reward is interpreted as a sign of competence, thus having an informational character. It is expected that people who outperform others or reach a certain goal do not suffer from decreased intrinsic motivation but evidence points differently (Deci et al., 2001). For example, if people do not perform as good as the best 20 %, which is probably found more often in real world, performance-contingent rewards decrease their intrinsic motivation drastically (Deci et al., 2001). This evidence indicates that rewards other than verbal-informational or unexpected tangible rewards are a serious threat for intrinsic motivation.

Causality Orientations Theory (COT)

According to the COT, the extent to which individuals experience their acting as self-determined differs interindividually (Vansteenkiste, Niemiec, & Soenens, 2010). People who are high on the autonomy orientation are more likely to act according their own interests and values, interpret external events as informational rather than controlling and are expected to regulate their behavior autonomously (Vansteenkiste et al., 2010). Those who are highly

control orientated act more likely because of external or internal demands, perceive external events as pressuring and regulate their behavior with an experience of control. A third proposed group are people who tend to interpret events as beyond personal control and thus have feelings of helplessness, ineffectiveness and passivity. These people are impersonally oriented. Asendorpf and Van Aken (2003) proposed a clear distinction between causality orientations and personality traits. Causality orientations are expected to be more dynamic and shaped by socialization experiences. The COT states further that all three causality orientations exist in varying degrees in each of us and situational factors determine which causality orientation is more salient although one is expected to be the predominant motivational orientation. Causality orientation affects the influence of external events on intrinsic motivation. Hagger and Chatzisarantis (2011) found that autonomy-oriented causality orientation protects people from the negative effect of completion-contingent rewards on intrinsic motivation. Results indicate that control-oriented participants in their experiment showed a desired behavior only as long as rewards were given. A study by Amabile, Hill, Hennessey, and Tighe (1994) showed that a more autonomy-oriented causality orientation predicts higher levels of intrinsic motivation compared to control-oriented and impersonal-oriented causality orientations. Yet little is known about the distribution of these orientations among the general population.

Goal Content Theory (GCT)

The GCT distinguishes intrinsic goals such as personal growth, close relationships, community contribution and physical health from extrinsic goals such as money, fame and image (Ryan, Sheldon, Kasser, & Deci, 1996). Whereas intrinsic goals support the perception of a task as being satisfying on its own, extrinsic goals serve an external purpose. It is important to note that it is possible to strive for both intrinsic and extrinsic goals for either autonomous or controlled reasons. Vansteenkiste et al. (2010) used the example of a retiree that may volunteer either because he would feel guilty for not contributing to society (controlled motivation) or because he really likes volunteering (autonomous motivation). Studies (e.g., Deci & Ryan, 2012; Kasser & Ahuvia, 2002; Williams, Niemiec, Patrick, Ryan,

& Deci, 2009) have shown that intrinsic goal setting supports learning, well-being and satisfaction. Critiques argued that intrinsic goals are valued more than extrinsic goals in our society and thus the value of the goal determines dedication to the task at hand (Kasser & Ahuvia, 2002). A number of studies (Lens, Simons, & Dewitte, 2001; Lens, Simons, & Dewitte, 2002; Vansteenkiste et al., 2004) have compared three conditions with manipulated goal content: intrinsic goal framing, extrinsic goal framing and a dual-goal framing where the participants have been informed about both possible goals. Results show that having just an intrinsic goal framing still led to a better performance than having both, intrinsic and extrinsic goal framing. SDT can explain this result with the possible impairment of intrinsic goals with extrinsic goals, depending on the participants' own task orientation (Ames, 1992).

The Flow State

Self-determination theory seems to be a promising approach for making predictions about the quality of motivation and the effects of rewards on intrinsic motivation. Another very interesting yet different approach for describing motivation processes is the theory of flow by Csikszentmihalyi (1990). This concept has been used to describe the best possible design in many studies (e.g., Chen, 2007; Pilke, 2004) and can already be called a classic in human-computer interaction research. Despite flow being more of a process and SDT being a theory of motivation that is including factors like personality, development and social context, they do have overlaps (Kowal & Fortier, 1999). The concept of flow has been developed over the last 35 years by Csikszentmihalyi (1990, 1998) and has its rooting in positive psychology. Flow is considered as the *optimal experience*, a state of mind and body with absorption and enjoyment. When everything comes together and we feel totally focused and involved in the task at hand, we experience flow (Jackson, 2012). Csikszentmihalyi also called flow the autotelic experience, which means doing something for its own sake – a concept related to intrinsic motivation. The complexity of task one's carrying out doesn't influence flow; it can occur during most complex surgical procedure or during a simple game of tag. Indeed, Kowal and Fortier (1999) have shown that flow can occur in a myriad of life domains, such as school, work, leisure and sports. Csikszentmihalyi (1990) has postulated nine dimensions that should

together represent the optimal psychological state of flow. These conceptual elements are 1) challenge-skill balance; 2) action-awareness merging; 3) clear goals; 4) unambiguous feedback; 5) concentration on task; 6) sense of control; 7) loss of self-consciousness; 8) time transformation; and 9) autotelic experience. The first three elements, challenge-skill balance, action-awareness merging, and clear goals are pre-conditions of flow (Csikszentmihalyi, 1990).

Challenge-Skill Balance

The dynamic challenge-skill balance is probably the core element of the flow concept. In order to experience flow, both the challenge of the situation and the skill to meet the challenge need to be at an individually high level (Jackson, 2012). This balance is called *flow channel*. As Figure 2 depicts, if one is above the flow channel (i. e., the skill cannot meet the challenge) anxiety is likely to occur. In the opposite case, the result is boredom. What matters is only the perception of the challenge and skill level, not the objective analysis.

Action-Awareness Merging

This dimension describes the feeling of oneness with the activity (Jackson, 2012). People being in the state of flow often report as perceiving the activity as spontaneous or automatic with a sense of effortlessness (Csikszentmihalyi, 1990).

Clear Goals and Unambiguous Feedback

People experiencing flow report a sense of knowing what they are supposed to do (Jackson, 2012). Clear goals together with unambiguous feedback allow people to check their progress in a task anytime. Feedback can be both internal, such as body tension, and external. This aspect is related to competence in SDT.

Concentration on the Task at Hand

One tends to forget about all the unpleasant aspects of life and the thoughts do not wander but rather are focused on the task to accomplish. It is also described as pure mental order without any irrelevant information (Csikszentmihalyi, 1990).
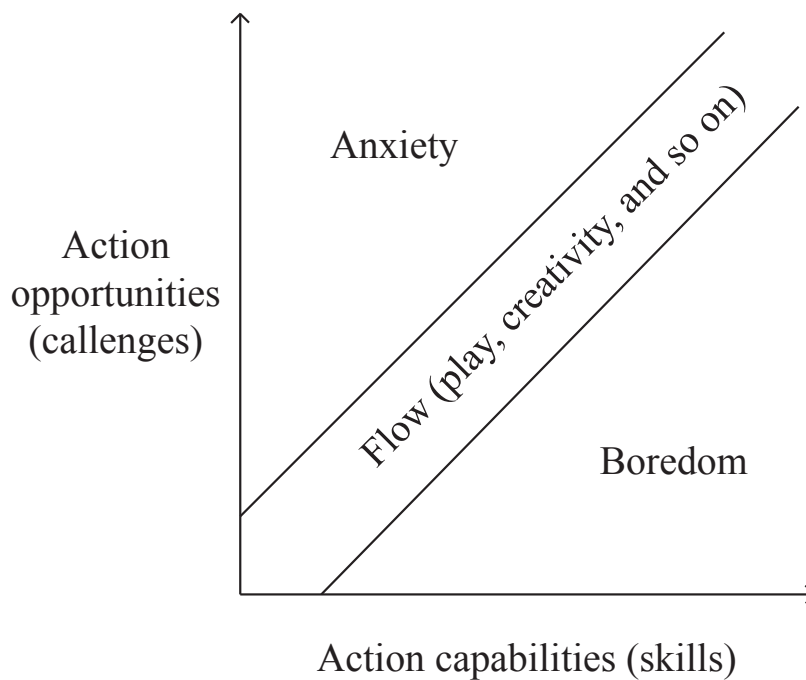
Figure 2. The flow channel is a balance between challenge and skill. Anxiety arises when challenges cannot be met with one's skills. If challenges are inadequate for one's skills, boredom accrues. Adapted from "The concept of flow", by J. Nakamura and M. Csikszentmihalyi, 2002, *Handbook of positive psychology*, p. 94.

Sense of Control

The sense of control also includes a feeling of liberation of the fear of failure and a feeling of empowerment. The task or activity is approached positively. It is necessary to expect one being in control because the sense of control keeps the flow alive as long as it is not too strong and reduces the feeling of challenge (Jackson, 2012).

Loss of Self-Consciousness

Due to flow, total absorption in the activity leaves no room to worry about self evaluation or about evaluations of others. Hence, flow can be considered liberating (Jackson, 2012).

Time Transformation

Another frequently mentioned flow byproduct is the transformation of the perception of time. For some, time seems to slow or stop and others perceive time to pass quicker than usual (Jackson, 2012).

Autotelic Experience

An autotelic experience is an experience so enjoyable and in itself rewarding that one is motivated to repeat it (Jackson, 2012). This is considered the end result of the other eight factors that enable flow (Csikszentmihalyi, 1990). It is striking how this experience resembles the concept of intrinsic motivation within SDT. This and other similarities will be reviewed in the discussion.

The existence of a challenging situation is necessary to conduce the state of flow. The balance between challenge and skills during flow has to be maintained very carefully.

Research on Gamification

Current state of research in gamification suggests that there is evidence for its success (Jung et al., 2010; Mekler, Brühlmann, Opwis, & Tuch, 2013; Thom, Millen, & DiMicco, 2012), but most studies rely on behavioral data of case studies. It is necessary to measure *engagement* or *need satisfaction* of a system in standardized environments using an experimental design. This is because it is important to understand how people interpret the elements of an activity and the situation it is embedded in (Csikszentmihalyi, 1990; Deterding, 2011). To understand the motivational benefits of gamification it might be worth taking a look at the research on video games. Ryan et al. (2006) studied the perceived autonomy, competence and relatedness in video games. They have found that the satisfaction of each of the three needs predict enjoyment and future game play. But it is essential to note that the context of a game situation is very different from a work situation (Deterding, 2011). Deterding elucidated this problem with the game element leaderboard deployed in the consumer relationship application *salesforce.com*. Social comparison might lead to a competitive dynamic among users and therefore increase engagement. But public

performance comparison at work, especially if tied to incentives and introduced by the management, has a great potential to reduce engagement because the voluntary and free-of-consequences aspect of games are missing. Therefore gamification might be perceived as controlling and it can decrease felt autonomy (Deterding, 2011). To discuss the opportunities and possible pitfalls of gamification three studies that used an experimental approach to examine the effects of gamification on user behavior, and in the study of Mekler et al. (2013) also on intrinsic motivation, will be introduced.

Group Collaboration

The study of Jung et al. (2010) has the potential to provide many insights into gamification although the authors never use the term themselves. The idea of the study was to integrate a *feedback mechanism* and an *optimal challenge* into a collaboration environment to enhance a system's motivational affordance, i.e., the systems properties that fulfill users' motivational needs (Jung et al., 2010). These two elements were selected according to design principles postulated by Zhang (2008). Zhang suggested ten design principles related to five different sources of motivation. These principles intend to fulfill the users' (1) psychological (autonomy and self); (2) cognitive (competence and achievement); (3) social, psychological (relatedness); (4) social, psychological (power, leadership, and followership); and (5) emotional (emotion and affect) needs (Zhang, 2008). Jung et al. (2010) chose feedback and optimal challenge because they assumed that principles focusing on cognitive motivational needs (i.e., competence and achievement) were most readily applicable for the short term setting of their study. Participants were assigned to groups and had to generate ideas for a problem at the university campus. Jung et al. hypothesized that groups provided with individual performance feedback will outperform groups not provided with such feedback. They also hypothesized that pseudonyms support performance additionally because it reduces the negative effects of social loafing in full anonymity and the effects of social inhibition when people know each other. As a third hypothesis Jung et al. stated that providing groups with either an explicit goal or a *do your best* goal will outperform the other groups. The explicit goal was expected to increase performance even further. Results show that feedback increases

both, quantity and quality of the ideas generated. Pseudonymity which is found in many gamification systems increased also both, idea quantity and quality. In the second experiment, Jung et al. crossed performance feedback (on/off) with goal (explicit/do your best). They found that feedback increases quality and quantity of ideas generated especially when an explicit goal was present. The groups with no feedback performed better with the *do your best* goal. This indicates that setting a difficult but attainable performance goal is only beneficial when clear performance feedback is provided (Jung et al., 2010).

Image Annotation Task

Mekler et al. (2013) examined the effects of points and meaning on participants' motivation and performance in an image annotation task. Participants had the task to generate tags for a set of 15 images. By instructing the participants to generate tags that would describe the emotional content of the images the authors tried to make the task slightly more difficult. In the control condition, users did not receive any points for their annotations and no meaningful framing (i.e., purpose for the task) was given. In the condition with points, every tag for an image was rewarded with 100 points and in the meaningful frame condition, the participants were informed that their tags were used to improve computerized affective image categorization and would thereby advance science. Mekler et al. found that both points and meaningful framing improved annotation quality and quantity. The combination of both factors yielded the best results. They examined not only behavior but also the participants perceived intrinsic motivation. Surprisingly, points and a meaningful frame increased intrinsic motivation to a similar degree. Only the absence of both led to a lower level of intrinsic motivation. Mekler et al. (2013) presumed that the points functioned as feedback and might have facilitated the fulfillment of the need for competence. These results show that it might be highly beneficial even for somewhat creative tasks to give immediate feedback in form of points and additionally, to set a clear goal as in the study of Jung et al. (2010). One thing among others that was left open in both studies is whether the feedback and the goal would increase motivation in the long term. Because the examined population were in the case of Jung et al. (2010) college students and in the case of Mekler et al. (2013) possibly likewise

well-educated people one might expect a high percentage of autonomy orientated people who interpret external events such as feedback more informational than controlling. It is also unclear whether points in a setting with pseudonymity (Jung et al., 2010) or anonymity (Mekler et al., 2013) are regarded more as verbal rewards or as tangible rewards. A different concern is about the enduring effects of these enhancements. Because the goal in the study of Jung et al. (2010) itself has no intrinsic value it might only work in a competitive setting and not last beyond the task of generating solutions for personally not relevant problems. The behavior change might be very different in the field of environmental protection where extrinsic rewards possibly decrease intrinsic motivation.

Removing Gamification

Because the long term effects of gamification have only been scarcely studied, the observations of Thom et al. (2012) are particularly interesting. Thom et al. (2012) examined the impact of the removal of a gamification feature installed in social networking system (SNS). The study focused on a points-based system that was deployed within a large IT enterprise with a globally distributed workforce of approximately 400.000 employees. For each added photo or list the users received 5 points and for each comment on a profile page, photo or list 15 points. When users reached a certain amount of points they leveled up and received badges displayed on their profile page. Those who had the most points were listed on a globally visible leaderboard. While the deployment of points initially increased contribution to the system Thom et al. found that the removal of all gamification features reduced the contribution significantly. For example, the amount of comments on profiles (5.5 comments per active user over a period of 2 weeks) was reduced by more than half (2.5 comments per user). This suggests that the removal of such a system is very costly. Zichermann and Cunningham (2011) already addressed this problem and stated that once installed, one might have to keep the reward system forever. Indeed, Thom et al. concluded that point-based rewards seem to motivate participation but even the temporally removal of it should not be taken lightly.

Discussion

Flow and Self-determination Theory

The concept of flow resembles intrinsic motivation in the area of self-determination theory. Both stress the enjoyment of the task itself (e.g., Deci & Ryan, 2004; Jackson, 2012), and Kowal and Fortier (1999) found that flow occurs more often when a task is intrinsically motivated. But Kowal and Fortier (1999) also found that scores of perceived autonomy are not significantly higher for the group with high occurrence of flow and that flow can occur during a task that is not intrinsically motivated. One possibility, which has however not been empirically examined yet, is that flow might shift the locus of control towards the inside. Because of this possible shift, it might be important to distinguish between the quality and levels of motivation at beginning, during the execution and after completion of an activity. Another similarity can be found when comparing challenge-skill balance, clear goals, unambiguous feedback, action-awareness merging and sense of control (properties of flow) to *competence*, one of the basic psychological needs. The feeling of competence could be a consequence of these five properties of flow, or vice versa (Kowal & Fortier, 1999). Even Ryan and Deci (2000b) use the term *optimal challenge* to describe intrinsic motivation within SDT. The flow channel – with its optimal balance between challenge and skill – is close to the actual definition of competence by Ryan and Deci (2000b). The appearance of flow in tasks that are not fully intrinsically motivated might indicate that this concept is somewhat related to usability or more likely that the flow concept is dependent on usability (in the HCI context). Indeed, O'Brien and Toms (2008) assume that engaging experiences can occur even during involuntarily uses of technology. Flow also includes concentration on the task at hand, loss of self-consciousness, autotelic experience, and time transformation aspects. While the time transformation and autotelic experience are difficult to relate to usability, concentration, loss of self-consciousness, clear goals, unambiguous feedback, action-awareness merging, and sense of control seem to have a lot in common with usability or at least are difficult to achieve without a usable system. A clear goal as well as the autotelic experience, where the superior goal lies in the task itself, might influence relatedness because people are more likely to experience themselves connected to others when the purpose of their action is evident.

Therefore flow seems to be a very well applicable concept in the process of designing for usability.

Self-determination Theory covers some aspects of motivation more extensively than flow. For example, the content of the task or goal seems to be more prominent in SDT. Additionally, the relevance of personality traits for a need for flow or even for an ability to experience flow do not seem to be clear. SDT allows predictions to be made for both, and it even extends flow by the concept of extrinsic motivation and – especially relevant for gamification – the effects of rewards. A slightly neglected part of SDT and flow is the role of emotion. The significance of emotional processes affecting motivation is not clear in this context, although emotion is a vital part of interaction with a system (Norman, 2002).

Gamification, Rewards and Motivation

The studies of Jung et al. (2010) and Mekler et al. (2013) showed that using game elements in a non-game context can increase a desired behavior. Both studies can be criticized in terms of not assessing a completely gamified system and not examining the long term effects of the used game elements. But it would be difficult to investigate the share of individual factors in the motivational enhancement in a full-fledged gamified system, because one could not attribute the effect to a single game element. Regarding long term effects, the study of Thom et al. (2012) provides the interesting insight that removing a gamification system can decrease the activity of its users. SDT explains this phenomenon in the following way: Extrinsic rewards shift the perceived locus of control of a behavior from internal to external (to a certain degree). Because external regulation depends on a separable outcome (e.g. a reward) the removal of this outcome diminishes the behavior. There are three factors which can influence this process: 1) personal factors (causality orientation); 2) situational factors (informational or controlling aspect of a reward); and 3) contextual factors (the systems' properties to fulfill needs, goals and setting of application).

Personal factors.   It is more likely that extrinsic rewards affect a person negatively if this person is externally oriented (perceives the event as controlling) than if the person is internally oriented (perceives the event as informational) (Deci et al., 2001). There could be

differences in causality orientations depending on the target audience of a gamification system. Despite causality orientation being relative stable, situational factors might influence motivation to a greater extent (Deci et al., 2001).

Situational factors. Pointing out the informational character of rewards in gamification, e.g. points and badges should reduce the negative effects they might have on intrinsic motivation. In general, verbal-informational rewards should work best, but it has so far not been examined whether virtual rewards fall in this category. Using other indicators of progress than points might solve the problem for some tasks (Nicholson, 2012). One possible approach could be to reveal more information about the task at hand for each completed level and to relate this information to a meaningful goal. In an image annotation task one could reveal a seperate image of a piece of art gradually. The benefit for a user is in this case easier to transfer to the context outside of the task, as long as the user is interested in art. Tangible rewards such as money should be applied very carefully and can possibly, according to SDT, undermine intrinsic motivation except if they are unexpected. Engagement contingent, completion contingent and performance contingent rewards are all expected to reduce intrinsic motivation (Deci et al., 1999).

Contextual factors. Framing a task intrinsically is another conceivably beneficial way to increase intrinsic motivation (Ames, 1992; Mekler et al., 2013). The content of a goal is also influencing the amount of intrinsic motivation as described by the goal content theory (Ryan et al., 1996). It would therefore be advisable to relate goals of an application to a wider context. Mekler et al. (2013) found that giving meaning to a task increases motivation to the same extent as rewarding users with points. As a non-gamified example, Facebook helps users to stay connected to the people they care about. Having such a purpose (or goal) should increase intrinsic motivation (Vallacher & Wegner, 1987). In the case of Facebook, gamification would probably reduce user activity because points would most likely not have an informational character.

Another relevant aspect is the content of the task itself. Although Jung et al. (2010) and Mekler et al. (2013) found higher short term contribution during a gamified creative task, it could be more problematic to reward people in a creative environment than while performing

simple tasks (Deci et al., 1999). Additionally, it might be particularly delicate to gamify a system that is already used by intrinsically motivated people (Deci et al., 1999). At least concerning short term motivation, this effect has not been replicated in the gamification context. However, intrinsic motivation outside of the gamification context is usually measured not only with performance measurements and questionnaires but also with repeated behavior without the reward (Deci et al., 1999). In general, it seems (except for video games) questionable whether people use an application just for the joy of using it. Typically software has a purpose that lies beyond the mere use of it; it serves a goal and if possible, one would skip the use of the software to attain the goal directly. Therefore, users are at the beginning of an interaction more likely to perceive their behavior as regulated *externally*. Organismic integration theory discriminates four possible external regulations: external, introjected, identified and integrated regulation (Ryan & Deci, 2000a).[1] Any of these regulations could be the starting point of using a gamification system. Having only extrinsically motivated users of a gamification system raises the question whether it is really necessary to design for intrinsic motivation or for increased integration. Zichermann and Cunningham (2011) argue that practitioners should not care about it and rather try to maximize extrinsic motivation. It is true that intrinsic motivation is just another quality of motivation than extrinsic motivation and does not state whether the level of motivation is higher. But intrinsic motivation is still important in two ways: 1) intrinsic motivation increases the likelihood of repeated behavior (Deci & Ryan, 2004) and 2) the motivational effect of simple rewards might wear off over time (Lepper, Sagotsky, Dafoe, & Greene, 1982). For example, using a gamification system just because one gets points is not a long lasting justification. It is therefore even for simple tasks advisable to facilitate intrinsic motivation. For complex tasks it might even be better in some cases to abstain from gamification, at least if there is a possibility that it may be removed in the future (Thom et al., 2012), because removing a tangible reward is expected to reduce intrinsic motivation and consequently participation (Deci & Ryan, 2004). But this relationship has to be further empirically examined.

    To facilitate intrinsic motivation, the basic psychological needs namely competence,

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[1]Amotivated people would not use the application in the first place.

autonomy, and relatedness should be fulfilled with the systems' properties (Ryan & Deci, 2000a). Features supporting autonomy such as customization, individual goals, and alternatives of action should be implemented in every bigger system. Properties for the fulfillment of competence are probably already implemented in many gamification systems. Challenges should grow with the increased skills of the user. In case of relatedness, it is advisable to give meaning to the use of a system, to allow mutual assistance, and community activities. Game elements can support the satisfaction of needs (Ryan et al., 2006), but it is unknown to what extent each element is contributing and in what way the context modifies it. Additionally to the suggestions based on SDT, the state of flow as the highest goal in software use is useful as a guidance. Flow is not limited to situations of intrinsically regulated behavior but is certainly more likely to occur then (Kowal & Fortier, 1999). In the case of gamification it would be advisable to follow both the basic needs of SDT and flow. Flow has a more practical approach and includes aspects such as action-awareness merging, concentration on the task at hand and sense of control – all being related to usability. Clear goals and feedback are also aspects that well-designed gamification systems should include.

More research is needed to determine which game element is able to fulfill which motivational need. It is not known whether more elements are always better than less elements or if a certain combination thereof might be even more beneficial. Additionally, it would be interesting to examine the controlling or informational aspects of game elements in different contexts (e.g., sustainability versus economizing) and whether feedback of game elements is more likely perceived as verbal or tangible rewards. Long-term effects of gamification and the influence of task complexity should be analyzed in more detail. What is perhaps most surprising is that very little is known about why people use gamification systems in the first place. Knowing the type of motivation a user has at the beginning of an interaction with a system might determine the optimal design of it.

From the perspective of self-determination theory and flow, just adding some gamification elements to an existing system is certainly not the best approach. In the same way that rewards do not make a boring activity enjoyable in the long run, gamification does not fix bad design.

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